The RCEME QUARTERLY

Volume 3 APRIL, 1951 No. 2

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OUR COVER -- Night shot of 'cat cracker' at Montreal East refinery of Imperial Oil Co; see story on page 11.
(Imperial Oil Photo)

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1951

THE RCEME QUARTERLY

The information and statements herein are not to be quoted as authority for action. The Quarterly is published to assist RCEME personnel in keeping abreast of current trends and developments and to circulate interesting news about the corps.

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EDITORIAL

In our efforts to increase the efficiency of our Workshop operations, we must not lose sight of the wood for the trees. What is the ultimate purpose of our existence, as members of the Corps of Royal Canadian Electrical and Mechanical Engineers? Is it to reduce the cost of repairing Army field equipment; or to prevent the user arms from wrecking their vehicles through lack of maintenance; or is it to recover tanks that have dropped into ravines?

It is not any particular one of these. Our main objective is this: to ensure that the fighting arms have the tools wherewith to destroy the enemy. In other words, we are a Service. Just as the Dental Corps sharpens up the infantryman's teeth so that he can chew his spam the better, so must we fix the vehicle that takes him into battle, or the weapons that he fires into the enemy lines.

During a time of peace, the administrative and technical side of the Army tends to overshadow the fighting element. This is largely because it takes very much less time to train an infantryman than a tiffy. Furthermore, there are quantities of equipment to maintain, even though they be in storage; and installations to repair and keep in trim.

It's a fact that each RCEME craftsman must be a fully trained soldier before he can draw his trades pay even in the lowest group. On parade he must be no less smart than a Guardsman. In Korea (and elsewhere) all troops must know how to defend themselves individually. There may be times when the technical services are asked to undertake the operation of belligerent equipment in the absence of trained personnel of the appropriate user arm; workshops in REME or RCOC(E) have held the line before now. But RCEME must remember that this is not its primary function, however tempting it may be to brag about it to the uninitiated civilian. Though RCEME are combatant troops, RCEME does NOT fire field guns at all, and small arms generally only in order to zero them, and it only drives tanks to test the engine or the transmission.

Let us now turn to an analysis of how we can discharge the duties which are, in fact, ours. Let us look at it from the point of view of results obtained. RCEME will have done its job 100% when the equipment which is sent in to it for repair is replaced in commission at the earliest possible moment, when derelicts are recovered with the minimum of delay, and when the cor-

(Please turn to page 32)

25 Cdn Support Workshop CASF

A new unit has been formed in RCEME: 25 Canadian Support Workshop. The purpose of this unit is to provide 2nd to 4th echelon repairs for equipment used by units of the Special Force. The Workshop was formed to supplement US Army 4th and 5th echelon workshops with a Canadian unit tooled, scaled and trained to make heavy repairs to equipment peculiar to the Canadian force. In addition to the normal workshop section it contains a Port and Depreservation Section which is capable of operating independently of the workshop proper. The workshop is also able to provide in a smaller scale, the services usually supplied by an L of C recovery company.

The RCEME School at Barriefield was selected as the place in which the unit would organize before physically joining the Special Force. Fittingly enough, the first member to arrive was the OC, Major W. A. Down, ED, who was already in Kingston as Area EME, Eastern Ontario Area. During the first two weeks of November, he worked with the RCEME School in determining policy for the organization and training of the new unit. He was joined by the remaining officers of the workshop about the middle of the month, and active planning was begun. Unit facilities and equipment at this stage consisted of one office, furnished with one table six foot folding, several chairs, a telephone and ashtrays, and the latter were soon to be overflowing as the job in hand was tackled.

Several primary problems presented themselves. Arrangements had to be made to house, feed and equip personnel, and plans made for unit training. Duties were distributed and the following appointments made: Capt R. A. Auckland, 2i/c & OIC Workshop Section; Capt J. B. Dewhurst, Administration Officer; Capt B. A. Beneteau, OIC Port & Depreservation Section; Lt R. A. Hill, Workshop Section Officer; Lt N. G. Lane, Workshop Section Officer and Lt G. L. J. Glasford, Spare Parts Officer.

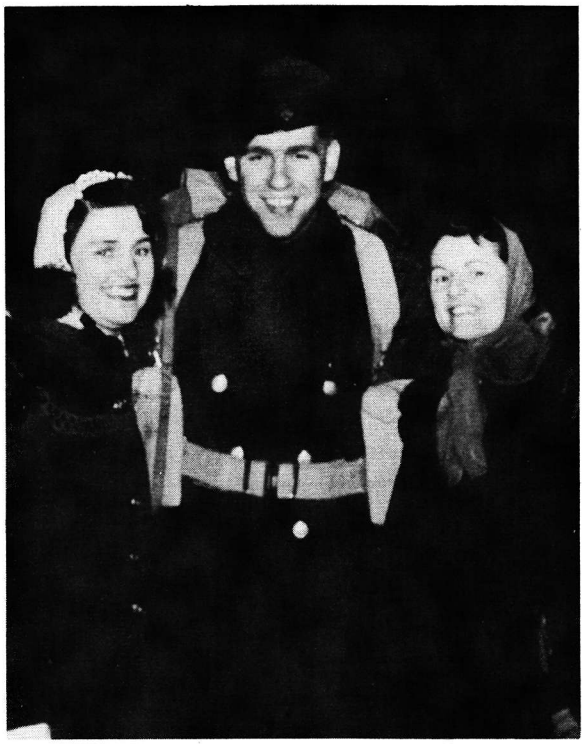
Capt B. A. Beneteau and Major W. A. Down on train steps.

WOI Saunders, WOII Bews, WOsI MacMillan and Oxley bidding farewell to WOI Guilfoyle.

Two buildings were taken over from the RCEME School, one a barrack block, and the other an ex-TMQ (already steeped in the atmosphere of Special Force organization by our predecessor, 191 Cdn Inf Wksp), which served as office and storage space.

Although some 87% of the unit establishment was to be filled by Active Force personnel, it was felt that their General Military Training was far enough behind them to warrant an organized refresher course. In this respect we benefited from the experience of 191 Wksp. Lt N. G. Lane and Lt R. A. Hill drew up the train-

ing syllabi for our refresher course. In addition, it was felt that better personnel control could be effected if the unit did its own training. We obtained the loan of training accommodation and facilities from the RCEME School, and two of their instructors were turned over to us for as long as they were required. This and other help which we received from the School was invaluable. As our own personnel arrived, they were subjected to a week of screening which produced sufficient instructors to carry out our



Cfn E. S. Lanning bidding farewell to two admirers.

training program. The eighteen Special Force enlistees were turned over to the RCEME School in a body and given normal recruit training by the GMT Company.

By the time personnel began to arrive, training plans were completed, and when the bulk of the Active Force people had joined the unit by the following week, training commenced.

As little as possible was permitted to interfere with training; documentation and other administrative work was done at night.

The QM staff of the School will remember our first QM parade for some time, when the X, Ys, and Zs were still filing through the stores at midnight! As it was felt that the unit was liable for a move early in the New Year, it was intended that refresher training be completed by Christmas. With some omissions and changes due to the weather and other factors, training was completed as intended, and was climaxed by the DME's inspection, when the unit paraded in battle order. His remarks indicated that in his opinion the unit was in fine shape, ready to perform the important role of a RCEME workshop with the Canadian Army Special Force. As there was more definite warning of a move by this time, Christmas and embarkation leaves were combined, and by 23 December, personnel from all the provinces were on their way to spend the holiday with families and friends.

By the 8th of January, everyone had returned and energies were directed towards cleaning up the backlog of administrative detail that had been allowed to lag in order to complete training. Kit inspections revealed many deficiencies to be made up; the medical people had numerous needles to inject or blood samples to take; the dentist had to check teeth. Also, the unit was slated to be inspected by the Area Commander, Eastern Ontario Area, and the combination of preparation for inspection and preparation to move produced many hectic moments. Somehow everything was done in time. This inspection was in marching order, and the excellent appearance gave unit morale a big boost. One of the highlights of the inspection was the first hand instruction in sock darning that one soldier received from the Area Commander!

By the time our final movement order came through the recruits had finished their training, and the unit prepared to leave for Fort Lewis on the 18th of January. An advance party was sent ahead and had things pretty well in shape for the arrival of the main body on the 22nd of January. The rear party has since arrived and the workshop is now getting settled down in its new location. Everyone is quite anxious to get on with the job, and this next phase of our unit's history will remain for a later story.

(Photos by Capt H. B. Lightfoot)

The Director inspecting part of the unit.

AUTOMATIC TRANSMISSIONS

By WOII G. CHARLES, RCEME

It is likely that within the next six years or so all new motor vehicles will be equipped with some form of automatic transmission.

In order to familiarize readers of the RCEME Quarterly with this comparatively new phase of mechanical science, this first of two articles describes briefly the history and basic technical principles of automatic hydraulic transmissions. The next article will point up the difference between fluid couplings and torque converters, and give as complete a summary as possible of the various types now marketed. —Eds

Transmissions exist on motor vehicles only because of deficiencies inherent in the engine itself; for if the turning effort of the engine could meet driving requirements under all conditions of operation, there would be no need for a transmission or clutch. In a vehicle, the ratio between the turning effort (or torque) produced by the engine and the torque required at the driving wheels varies widely with different conditions; thus, a very high torque is momentarily required to start a stationary vehicle moving, and considerable excess torque must also be held available in reserve to enable it to accelerate and to negotiate grades and obstacles. Unfortunately for automotive application, however, the torque of a gasoline or diesel engine is zero at zero speed and reaches its maximum at relatively low vehicle speed (approximately 30 miles per hour in direct drive on the average car). Lack of high torque initially required can be overcome by introducing a clutch which, when carefully manipulated by the driver, will allow the engine to be started and raised to a reasonable torque-producing speed before this torque is applied more-or-less gradually to the wheels. A different approach is required to provide for the excess reserve torque, however. At first thought it might appear possible to overcome this deficiency by merely installing a more powerful engine, but this is impractical because, as has already been pointed out, maximum engine torque is reached at quite low vehicle speed. The usual way of increasing or multiplying wheel torque has been by interposing a series of reduction gears between the engine and the rear wheels by means of which the driver can select the proper ratio to best suit the conditions he encounters.

This solution has not proven entirely satisfactory. One good reason (drivers as a rule being a lazy bunch) is illustrated at figure 1. Another reason is that the possible operating range in any given gear is severely limited. As it is a natural tendency for a driver to reduce gear shifting to a minimum, this results in the engine being allowed to 'race' or to 'lug', and either condition will cause it to deteriorate rapidly. This problem of properly selecting and promptly engaging the right gear in the right place is no easy one even for an expert driver. Consequently, ever since the early days of the automotive industry the efforts of engineers and inventors have been directed toward finding a simple means of applying and automatically adjusting adequate torque to the driving wheels.

It is believed that the first attempt to make

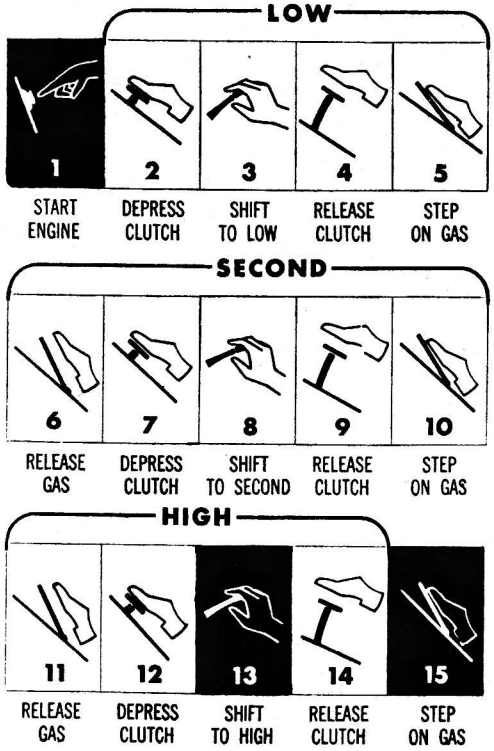


Fig 1 - All operations except 1, 13 and 15 have been eliminated by automatic transmissions.

an automobile transmission function automatically was made by the Sturtevant brothers of Boston away back in 1904. This job had only two forward speeds and was equipped with two automatic friction clutches which were engaged by centrifugal weights rotating at engine speed. One clutch, which engaged at a relatively low rpm, gave a low car speed through double reduction spur gears, while the other, which engaged at a higher rpm, gave a direct drive by clutching the main drive shaft to the fly wheel. The reduction gears free wheeled when direct drive was picked up. This arrangement was not very flexible and was never taken into general use.

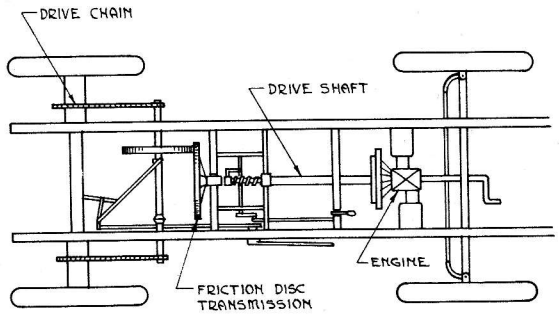


Fig 2

Another early form of transmission was the friction-disc drive which is illustrated in figure 2. This was more or less successful with early low power engines, but with increases in engine power it became more and more difficult to avoid excessive slip, and finally this arrangement was given up. Other and very ingenious mechanisms were produced from time to time but, due to various shortcomings, none achieved any continued success.

In more recent years some manufacturers have achieved a partial solution to the problem by adapting variations of the conventional countershaft type transmission to semi-automatic operation. While these do reduce the driving effort required to get a car under way, they aren't of much help in finding the right gear for the right job.

Perhaps the simplest of these is represented by the Hudson Drive Master. This is basically a conventional three speed synchromesh transmission with a vacuum cylinder and piston arrangement which operates the clutch and actuates the second-to-high gear shift lever. Normal starts are made in second gear and the vacuum cylinders disengage the clutch and shift the transmission into high whenever the accelerator pedal is momentarily released, provided the vehicle speed is over 13 mph. This last is controlled by a governor driven by the output shaft. The clutch automatically disengages and the transmission shifts back to second whenever vehicle speed drops below 10 mph. Installation of an overdrive unit back of the transmission completes the effect of a three speed transmission. Low gear can be manually engaged when needed and a switch is provided to convert the transmission to conventional operation whenever the driver becomes unhappy with its semi-automatic features.

Another, a somewhat more extreme variation, is represented by Chrysler's Fluid Drive. This arrangement consists of a four speed, two range gearbox mounted behind a fluid coupling and a conventional foot-operated clutch. The clutch is only used when shifting from neutral into high or low range after which all normal driving can be done without touching either the gearshift lever or the clutch pedal. Most driving is done in high range. Starts are made in third gear and a hydraulically operated cylinder and piston arrangement completes the shift into fourth speed whenever the accelerator is momentarily released, provided that speed is over a fixed minimum. Earlier models used a vacuum operated arrangement in place of the hydraulically operated shift mechanism, but otherwise operation was essentially the same. When necessary, a 'kick down' shift from fourth to third can be made by depressing the accelerator pedal all the way down. A special switch then causes an interruption in the ignition circuit momentarily breaking power flow and gear loading, and hydraulic or vacuum actuation completes the shift back into third. Similar automatic shifts can be effected when the transmission is in low range.

Stopping without disengaging the clutch and starting in the next to the highest gear is possible in this type of transmission because of the fluid coupling, of which more below.

The fluid coupling, also called 'fluid drive', 'fluid flywheel', or 'fluid clutch' is the basic hydraulic mechanism in several transmissions, and in one small motorcycle it even comprises the entire transmission. This mechanism consists essentially of a bowl-shaped driving member or 'impeller' and a very similar driven member or 'runner' to each of which are fixed a number of radial vanes. Each member closely resembles a grapefruit half when the pulp has been removed to expose the dividing membranes. No mechanical connection exists between the runner and impeller—the coupling being filled with oil which acts as the sole torque transmitting medium between the two members. When the runner is held stationary and the impeller is revolved by the engine, centrifugal force causes the fluid to flow radially toward the outer diameter of the impeller, across the gap to the runner and back through the runner compart-

ments towards the centre of the coupling. As the spinning fluid is thrown from the impeller into the runner, it impinges against the runner vanes and develops a torque in the runner. The same action will also take place when both members are running—always provided that the driven member is running at a slower speed than the impeller.

It must be emphasized that the fluid coupling does not multiply or in any way increase the torque applied to it. If 100 foot-pounds torque is applied to the impeller, theoretically the most torque that can possibly be transmitted by the runner would be 100 foot-pounds. Actually it would be less because of slippage loss. In this respect the fluid coupling differs entirely from the torque converter although to a casual observer both might appear deceptively similar. The torque converter, by reason of the fact that it is constructed with stator and rotor stages like a turbine, actually does multiply the torque applied to it as much as five or six times depending on design. The operation of this mechanism will be more fully discussed in the next article.

The fluid coupling merely acts as a very smooth slipping clutch which will safely withstand an amount of slippage sufficient to destroy a mechanical clutch by heat and for this reason it may be used to eliminate one or two of the gear ranges otherwise used in a conventional transmission. It is believed that the heat developed because of slippage is comparable in both. The fluid coupling's main advantage over a mechanical clutch is that it does not have to be slipped with the foot, while the latter, when in a partly engaged position, requires skillful and experienced operation to transmit torque smoothly.

To-day's fully automatic transmissions may generally be divided into two categories—those which employ a torque converter to give an infinitely variable ratio between gear changes and those which leave it up to the engine to produce the variable torque between each shift. An example of the latter type is General Motors' Hydra-Matic which in the last decade has been successfully used on a number of well known automobiles, and modifications of which saw extensive wartime service in the M5A1 and M24 light tanks, and Staghound armoured cars.

Since the basic mechanical element of most automatic transmissions in use to-day is the epicyclic or planetary gear train, a brief review of this mechanism is given below.

As illustrated in figure 3, a planetary gear train consists of three elements. These are the central 'sun gear', a spider or 'planetary carrier' having pivots for one or more 'planet gears', and the outermost 'internal gear'. Some advantages of such a set are that all gears are always in mesh, torque loads are always distributed over several teeth, the gear is very compact, and the shafts of the three elements of the gear are coaxial. The main advantage, however, is its remarkable versatility since it can either be used as a clutch, a reduction gear, a coupling, or a reversing gear, by merely holding one of its three elements or locking two of them together. In practice, this effect is usually achieved by building a clutch into the gear set between the 'sun gear' and the 'internal gear' and by putting a brake band round the outside of the 'internal gear'. Thus, engaging the clutch and releasing the band locks the gear set together

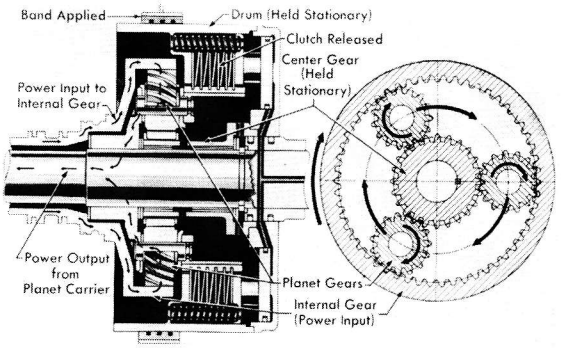


Fig 3. Planetary gear train

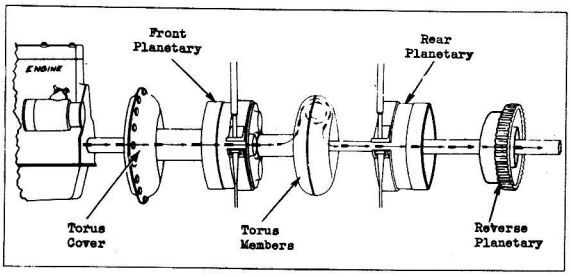


Fig 4 - Schematic location of units in Hydra-Matic drive.

and makes it a solid coupling, releasing the clutch and engaging the brake makes it a reduction gear, and releasing both brake band and clutch causes the mechanism to idle in neutral. This arrangement was successfully used by Ford in his famous old Model T for many years but it gradually fell into disfavour when it was found that two speed ranges were not enough to meet the requirements of modern automobiles.

The Hydra-Matic transmission gets around this deficiency by using two sets of planetary gears, arranged in series, making possible four forward speeds. An intricate system of hydraulic controls automatically make the shifts from one gear to the next, and a fluid coupling and the clutches built into the planetary sets do away

Make	Transmission	Description
Hudson	Drivemaster Supermatic	Conventional clutch and 3 speed synchro mesh transmission. Starts normally made in second gear and shift to high is made automatically when throttle is momentarily released. Automatic declutching and shifting effected by vacuum actuated pistons.
Chrysler Desoto	Prestomatic Tip Toe Shift Gyromatic Simplimatic commonly known as Fluid Drive	Four speed constant mesh, countershaft type transmission mounted behind a fluid coupling and a conventional clutch. Normal starts made in third gear and shift to high is automatically made when throttle is momentarily released. Clutch is used only when shifting into reverse, low, or high range. Automatic control may be either hydraulic or vacuum operated.
Oldsmobile Cadillac Pontiac Lincoln	Hydra-Matic	Four speed, planetary type transmission operating in conjunction with a fluid coupling. Shifting is fully automatic through all four speeds and is effected by hydraulic controls. Points at which shifts occur depend on a combination of vehicle speed and accelerator position.

Fig 5

with the necessity for a conventional clutch. The fluid coupling, although physically adjacent to the engine flywheel, actually is connected between the two planetary gear sets. As a result, when the transmission is in low gear, the fluid coupling runs slower than the engine, with a consequent reduction in the tendency of the car to creep when it is standing with the engine idling. Shifts depend on vehicle speed and accelerator position—shifts, either up or down, coming at higher speeds when the accelerator is depressed than when it is released. From standing starts in high range, the transmission shifts through the 1-2-3-4 pattern. In low range, only the first two gear ratios are used, and the shift from 1 to 2 comes at a higher speed than with the corresponding accelerator position in high range.

Fig 5 tabulates the various forms of transmissions dealt with in this article.

(To be continued)

YOU'RE A FIGHTIN' MAN, SIR!

Said the Director at the EMEs' Conference: "There has been a lot of talk about the arms and services, and I want to make sure you all know that there is an order placing us on combatant status. We are combatant and there are no restrictions."

We looked it up and by St. George and the Dragon he's right (we thought all the time he was). Canadian Army Routine Order No. 4996 (18 Oct 44) states that General Order 460 of 1944 amends GO 127 of 1944 (which authorizes the organization of the Corps) to read:

"Officers and other ranks of the Corps of Canadian Electrical and Mechanical Engineers shall be combatant in the fullest possible sense."

(l to r) Cfn Wm Cameron, Capt E.F. Hendricks and S/Sgt D. Ewart, of 191 Inf Workshop CASF.

1950 RCEME CONFERENCE

THE DIRECTOR & DELEGATES TO THE CONFERENCE

Front row (l to r): Lt-Col H.G.F. Morgan, MBE, Comd EME, Eastern Command; Lt-Col C.W. Jones, DDME; Col C.R. Boehm, MBE, DME; Lt-Col J.R. Dunlop, OBE, ED, CO The RCEME School; Lt-Col G.F. Bradbury, Comd EME, Prairie Command and Lt-Col H.L.K. Mason, MBE, CD, Comd EME, Central Command. Centre row: Lt-Col C.M.R. Elmsley, CD, ADME P&T Group; Lt-Col E.C. King, ADME Workshop Group; Lt-Col R.F. Jobson, OBE, Comd EME, Western Command; Lt-Col A.J.R. Stethem, CO 202 Base Workshop, RCEME and Lt-Col E.W. Coleman, CD, CO 17 Coy RCEME. Back row: Major V.W. Bethel, DADME Tels Group; Lt-Col A. Miller, Comd EME, Quebec Command; Lt-Col C.G. Kirby, MBE, ADME Vehicle Group and Major I.M. McLaughlin, DADME Armament Group.

The 1950 RCEME Conference was held at the RCEME School, 15 - 18 Jan and AHQ 19 - 20, 1951. The conference is held annually to discuss RCEME problems and policy for the ensuing year.

The Director opened the conference at 0900 hrs on the 15th with a welcome to all delegates, and expressed on behalf of all present their appreciation of the school hospitality.

While the actual discussion and business before the delegates is beyond the scope of this short report, certain displays and demonstra-

(Please turn to page 16)

PEDIGREED LUBRICANTS
the refinery process

By LIEUT W. J. MILDON, RCEME

A maze of steel reaching skyward—a crazy network of crooked, tortured pipes whose beginnings and endings are shadowed in obscurity—a nightmare to the casual onlooker—a beautiful pattern in action to the designer—truly a plumber's paradise, the modern petroleum refinery. There are over 100 miles of pipe in the average refinery, with just as many pipes below the ground as are visible above, and through these veins courses the life-blood of the industrial nations of the world.

In the previous article in this series, we have observed our problem child, Petroleum, and have ascertained his character. Being wise parents, we now wish to develop and shape this character, and prepare him to take up his duties in life. To do this we must correct his faults, eliminate them if possible, and assist him in attaining his vocation. A young lad who finds himself doing a job for which he has no inclination, will not put forth his best effort. He is maladjusted. Petroleum products, too, may be misapplied.

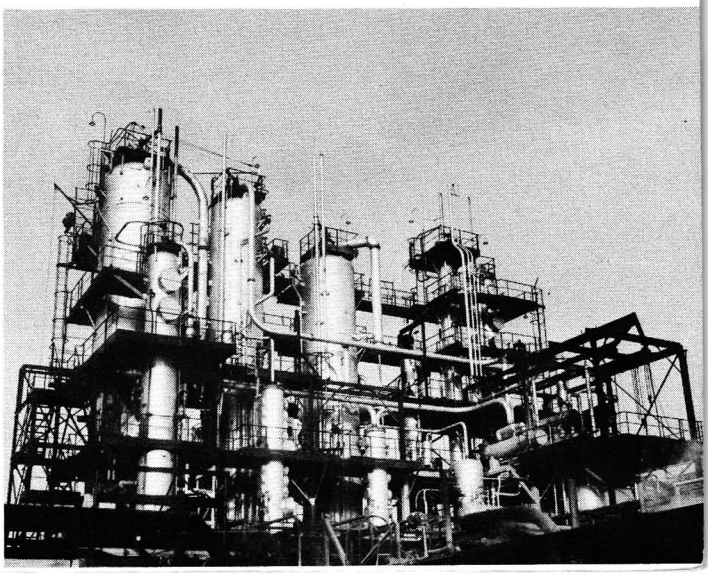
A psychiatrist will delve into the history of his patient, in particular the environment and upbringing prominent in his youth. In this way he usually is successful in diagnosing the case and prescribing the cure. We, however, have a tremendous advantage over our friend the psychiatrist—we can control the environment and upbringing of petroleum to make it suitable for practically any purpose where a lubricant or a fuel is required. For this reason, a knowledge of modern processes of petroleum refining is essential to the correct diagnosis of fuel and lubrication problems.

It is not possible, nor is it intended, in a short article to go into details of refinery operations and equipment. Each refinery differs in the type of equipment and processes employed, depending primarily on the nature of the crude stock, and the end products desired. In general, however, the sequences and unit processes are similar, and it is only this general picture that will be presented here. Of necessity, therefore, the diagrams are quite simplified, but this should not detract from their value; rather they should focus our attention on the salient points.

To do justice to such a discourse, it is proposed to discuss the refining of petroleum under three headings which are logical for a natural division of this subject, namely, fuels, lubricating oils, and greases. Each of these will be discussed individually in that order in separate articles dealing not only with refining procedures, but also with the properties so attained, the fuel or lubricating problems prevalent in service, and what remedial measures should be taken for their solution. Although the title is Pedigreed Lubricants, a discussion of fuels is justified, because in internal combustion engines, the best type of engine oil to be used is governed to a very great extent by the quality of the fuel used.

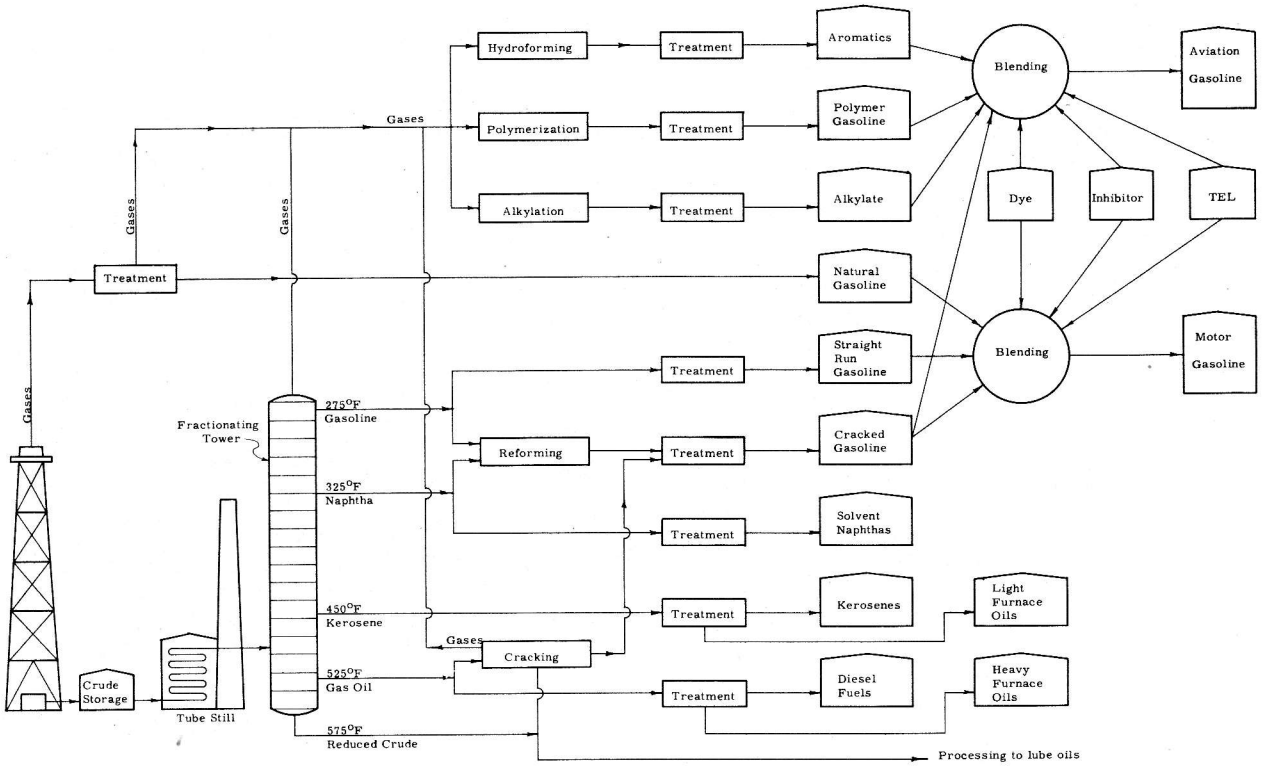
The actual beginning of the refining process takes place at the oil-well site. In new wells the crude oil is forced from its subterranean abode to the surface by the pressure of its own vapours, which may be appreciable. These natural gases are collected, compression-cooled and/or absorbed in a gas oil, which is then heated and stripped with steam yielding natural or casing-head gasoline. It gets this name because it is obtained at the casing-heads of wells. The recovered gasoline is further stabilized by heating under pressure to remove the light, high-

Combination unit in Imperial Oil's Calgary refinery



vapour-pressure compounds such as propane and butane. Being natural gasolines, these are extremely stable, which we now know means that they will resist any chemical change in their composition. For this reason they are desirable in commercial gasoline blends because of their reduced gum content, which is the result of the oxidation and polymerization of unsaturated compounds; but in spite of this excellent quality, the use of natural gasoline is limited to a small percentage in automotive gasolines. This is due to its high vapour pressure or volatility which can lead to vapour-lock in the fuel systems in summer operations. By the same token, however, the percentage of natural gasoline is increased in winter and arctic grades of gasoline for improved starting of vehicles at low temperatures.

The bulk of gasoline blends are produced by distillation and cracking of crude oil stock and subsequent purification. When crude oil is initially distilled, it is separated into various fractions of roughly equivalent molecular weights. Thus these molecules are approximately similar in size and weight, but not type. Consequently fractions obtained by distillation contain approximately similar proportions of paraffins, naphthenes, and aromatics as were present in the original crude oil. Additional refining treatment is necessary to remove the undesirable constituents and to segregate the more suitable components in the finished stocks. The flow diagram indicates the fractions obtained in this initial distillation.

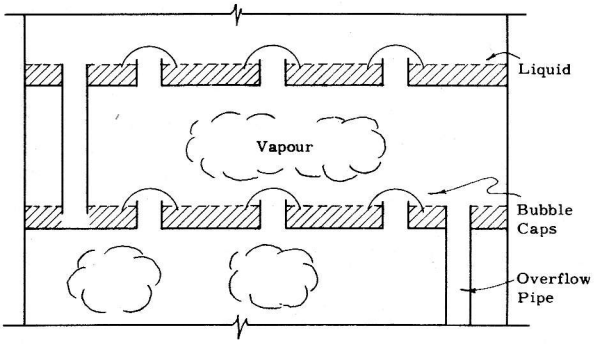


GENERAL FLOW SHEET FROM OIL WELL TO FUEL PRODUCTS

The crude oil is pumped through a tube still where it is heated rapidly to approximately 600°F, whereupon it flows into the first fractionating tower. This tower is normally run at atmospheric pressure usually with the injection of steam. Steam distillation facilitates the evaporation of the more volatile constituents of the crude at temperatures sufficiently low to minimize cracking or thermal decomposition. The more volatile constituents travel toward the top of the fractionating or bubble tower, while those of progressively higher boiling points remain at lower levels. In this way the hydrocarbons in the gasoline range travel to the top of the tower and are removed, cooled and condensed. A portion of the gasoline distillate fraction is return-

ed to the tower to act as reflux to maintain the tower temperature and fractionation equilibrium, and the balance is run to storage. With steam distillation, the steam also exits from the tower admixed with the more volatile oil fractions and is cooled and condensed with them and then separated for disposal. Gasoline, naphtha, kerosene, and gas oil distillate fractions are concurrently drawn from the fractionating tower at various levels and are run to storage for further processing into the finished motor gasolines, solvent naphthas, kerosenes, distillate fuels, etc, of commerce. The undistilled residue or reduced crude is drawn from the bottom of the tower for vacuum distillation into raw lubricating stocks.

In all towers in a refinery, fractionation or separation into various fractions is accomplished by means of bubble trays or bubble decks. A



SECTION OF BUBBLE TOWER

bubble tray consists of a plate across a tower so designed as to hold a volume of liquid through which vapours, forced from below the plate, can bubble. By means of bubble caps, the vapours rising in a tower are directed or forced to flow through the liquid on the tray. The tops of all towers are cooled or reduced in temperature so that the lightest materials pass over the top and the heaviest go to the bottom. The degree of separation required and the characteristics of the material to be separated determine the number of bubble trays in any fractionating tower. Bubble trays are used in flash towers, bubble towers, strippers, stabilizers, absorbers, and vapour separators.

Some type of chemical treatment is usually required for these petroleum distillates before they can be marketed, as they are generally unsuitable unless they are improved in colour, odour, stability to air oxidation, and corrosiveness. Gasolines are said to be 'sour' if they contain appreciable amounts of mercaptans (a type of sulphur compound). These are quite evident by a pronounced odour, and corrode metals readily. The mercaptans are removed by a sweetening process employing an alkaline solution of sodium plumbite (doctor solution) and free sulphur. In this way the mercaptans are converted to the relatively innocuous disulphides, but the sulphur content of the gasoline is not decreased.

The presence of sulphur in gasolines and diesel fuels has been found to be a major cause of wear in engines operating under unfavourable conditions such as in city delivery service or cold weather. The products of combustion of sulphur-containing fuels are sulphur dioxide and sulphur trioxide which dissolve in the water also formed in combustion resulting in solutions of sulphurous and sulphuric acid. Excess wear in engines can be caused by these liquids, but can be prevented by maintaining high coolant temperatures, so that these combustion products are largely blown out of the exhaust and have limited opportunity to cause engine damage. Also, a suitable engine oil should be used which resists this acid action and thus limits corrosion and wear. Obviously, the best remedy is to use a fuel containing as little sulphur as possible. The poor civilian who buys his gasoline on the market has no guarantee on the type of fuel he is purchasing; he can only trust in reputable manufacturers. The quality of government purchases of fuel, however, is protected by specifications and test requirements.

The refineries do try to keep their gasolines as free of sulphur as possible, for also another reason. Sulphur-containing gasolines have a

Vessels and fractionators of the cracking unit in the Imperial Oil Ltd., Edmonton refinery (Imperial Oil Ltd photo)

low lead susceptibility, which means that there is not much improvement in the octane number of the gasoline effected by the addition of tetraethyl lead, whereas sulphur-free gasolines receive a substantial increase in their octane rating by the addition of tetraethyl lead. The removal of sulphur compounds from gasolines is most satisfactorily accomplished by a carefully controlled treatment with sulphuric acid. The acid sludge is then either recovered or used directly as furnace fuel. The acid treatment is followed by an alkaline wash. Acid treatment also improves colour, and markedly reduces the formation of gum, since it removes the more reactive hydrocarbons.

The naphtha distillates are treated with acid in the same way to make them water-white, and thus suitable for cleaning fluids in textile industries. After acid treatment and alkaline wash, the distillates are refractionated into the various solvent naphthas of commerce, eg, iosol and varsol, by narrowing the range of the temperature cuts.

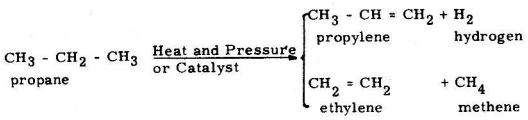
The kerosenes and illuminating oils are required to burn without a smoky flame or producing foul odours. The acid treatment process could be used here to remove sulphur compounds, but aromatic compounds which cause smokiness in the flame are not removed. The method used to refine the kerosene distillates is to extract them with liquid sulphur dioxide, which removes both sulphur and undesirable aromatic compounds. This very effective process cannot be used to refine gasolines, because aromatic compounds are desirable for their high octane ratings.

Gas oil is an intermediate distillate, and includes the heavy furnace oils and diesel fuels. The gas oil is further fractionated into the various grades of furnace and diesel fuels. In the early days of diesel engine development, one of the advantages claimed was that they were insensitive to the type of fuel used, and that nearly anything in the way of a burnable liquid would be satisfactory. While this is true within reasonable limits in the case of large, slow-speed diesels, the rapidly expanding use of high-speed, automotive type diesels has placed considerable emphasis on fuel quality. Ignition quality (cetane number) and volatility or distillation range are now considered to be important quality factors in fuels for high speed, automotive type engines. The ignition quality or cetane number of diesel fuels relates directly to ease of starting and smoothness under load. Fuels of cetane number below about 40 are generally considered as having poor starting and smoothness characteristics and also tend to aggravate engine fouling with soot, sludge and varnish deposits, largely because of poor burning qualities. The volatility characteristics of diesel fuels affect engine fouling and exhaust odour and smoking tendencies, again because of the poorer burning properties of fuels containing excessively non-volatile heavy ends. Distillation ranges of diesel fuels require careful control within limits in order to avoid engine operating and maintenance troubles.

Commercial gasolines contain a small amount (0.01% to 0.25%) of sulphur in the form of complex organic sulphur compounds. Sulphur content is generally maintained well below this maximum, and higher values are rarely encountered. On the other hand, commercial diesel fuels have sulphur content ranging from 0.1 to as high as 1 per cent, and fuels of higher ranges of sulphur content are becoming more prevalent due to increasing utilization of high sulphur crudes to augment the overall petroleum supply. As already mentioned, high sulphur diesel fuels create a serious problem because of their marked tendency to cause increased wear, sludge, and varnish deposits. However, no practical refining methods have yet been developed to remove sulphur from diesel fuels. Consequently, their utilization requires fundamental studies of improved engine designs which will be less sensitive to fuel composition, and of special motor oil formulations which may be capable of counteracting the higher wear and deposit forming tendencies. In this latter regard, there has recently been introduced Super Heavy Duty oils which contain from 2 to 10 times the amount of detergent additive present in more conventional Heavy Duty detergent oils, together with a proportional increase in the amount of oxidation and corrosion inhibitors. However, much more development work and service experience will be necessary before the exact role of special high additive content oils in alleviating high sulphur fuel problems can be defined. In the meantime where high sulphur diesel fuels must be used, more careful engine maintenance will be required, together with more frequent oil drains, so that the oil will be kept in best possible condition to combat the harmful action of sulphur and its acidic combustion products.

From the products obtained in the first fractionation of the crude oil, it can be seen that the total percentage of straight run gasoline produced is quite small, and would scarcely meet the demand for gasoline. Also, the use of higher compressions in engines has increased the requirement for higher octane fuels to more than can be obtained from straight run gasoline whose octane ratings range from 20 to 73. These two requirements, of increased gasoline yield and of a higher octane rating, have been met mostly by the process called 'cracking'. The cracking stock is the gas oil distillate obtained in the initial fractionation, and for which there had been relatively little use or demand. In this way the production of gasoline has been doubled.

Cracking is the process of breaking up long relatively non-volatile molecules into shorter more volatile hydrocarbon molecules. It can be accomplished either thermally or catalytically, but the latter method is preferable, because the cracking stock can be either naphthas, gas oil, or reduced crude. Cracking produces a new type of compound, the olefin, which is an unsaturated straight chain compound. It is very similar to the paraffins except that it contains one or more double bonds, ie, it has less hydrogens attached to the same number of carbons per molecule. A diagrammatic example of cracking is as follows:



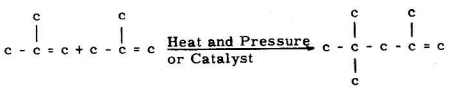
in which propane is cracked to a mixture of propylene, ethylene, hydrogen and methane. In all cracking operations some gas is formed as a by-product and is separated from the cracked gasoline in stabilizers. In thermal cracking carbon is formed on the walls of the reactor and has to be scraped off quite often. In catalytic cracking coke and tar are formed on the catalyst (aluminum silicate) which has to be regenerated when plugged up, but the process has been made continuous. For a continuous thermal process, several reactors are required so that while one is being used, the others can be getting cleaned up.

The presence of olefins increases the octane rating of gasolines but, because of their unsaturated nature, they are gum formers. Rather than remove the olefins by drastic acid treatment, the cracked gasolines are inhibited against gum formation by the addition of small amounts of phenols or aromatic amines. These gasolines are inhibited to prevent gum formation for a certain period of storage, usually about six months, and should be used up before then in order to avoid difficulties such as sticking intake valves and piston skirt varnish in engine operation.

Although increases of up to 25 octane numbers are attained by cracking, and several more by the addition of tetraethyl lead, the aviation industry requires large volumes of high octane gasoline. The addition of TEL does not improve the octane rating of cracked gasolines appreciably. Research towards the development of high octane fuels has resulted in several new processes being added to the petroleum refinery. These will be dealt with only briefly here.

Hydrocarbons of the isoparaffin (branched chain paraffins), olefin, and aromatic types have anti-knock qualities superior to the straight chain saturated compounds found in straight run gasoline, and for this reason refineries have developed methods to produce more of the desired type hydrocarbons from their crudes.

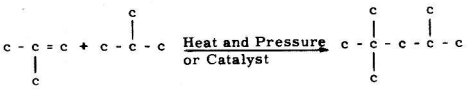
One of these developments was the polymerization process. In the cracking process we have seen that many gases are formed and the majority are olefins. By polymerization, by-products of cracking are converted into useful gasoline. Again, this process can be conducted either thermally or catalytically. Unsaturated short chain molecules combine to form longer chains of the desired type, thus:



isobutylene — diisobutylene (iso-octene)

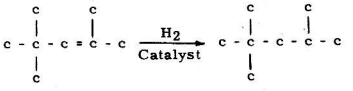
The products are longer branched chain unsaturated compounds and consequently liquids of high octane number.

Alkylation is very similar to polymerization except that only part of the charging stock need be unsaturated. The process again is either thermal or catalytic. The charging stock consists of paraffins rich in isobutane, and olefins. The isobutane is employed in large excess to prevent olefins from reacting with themselves. Fractionation separates the alkylation products into high octane gasoline, propane, ethane and isobutane, which is recycled. The reaction can be shown as



isobutylene isobutane — iso-octane

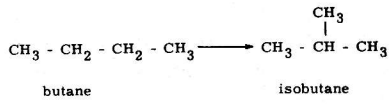
The hydrogenation process is a catalytic method of saturating with hydrogen unsaturated compounds, eg, diisobutylene, formed in the polymerization process, is converted directly to iso-octane for blending in gasoline.



diisobutylene — iso-octene

This process is common in Europe but rare on this side of the Atlantic. It has been considered uneconomical because although a catalyst is used, extremely high temperatures and pressures are required.

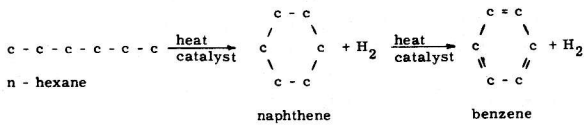
Isomerization is a process that has become very important for making the isobutane required in the alkylation plant for producing aviation gasoline. The charge stock is butane and is converted to isobutane at 250°F and about 300 lb pressure in the presence of anhydrous aluminum chloride catalyst. The reaction can be formulated:



and is in effect a process of rearranging straight chain molecules into branched chain molecules.

Reforming involves both cracking and isomerization. Straight run gasoline and light naphthas usually have very low octane numbers, and by sending these fractions to a reforming unit, and giving them a light 'crack', their octane number may be increased. This improvement is due mainly to isomerization or rearrangement of the atoms in the molecule to form iso-paraffins.

Cyclization and hydroforming or aromaticization are closely linked. They consist of catalytic dehydrogenation and ring formation of paraffins to form naphthenes and aromatics, eg,



The aromatic compounds are valuable blending agents in aviation gasoline because of their high anti-knock qualities.

No one refiner ever employs more than a few of these processes simultaneously. Available crudes, degree of utilization of existing equipment, the balancing of the proportions of finished products, the effect of a process on volatility, and the economics of the entire picture are all thoroughly considered in reaching the decision as to which method or methods will yield products of the desired quality, most economically.

(**CONFERENCE** continued from page 10)

tions which took place might be recorded for posterity.

In conformity with the strict military atmosphere maintained during the conference, the delegates were treated to Reveille. At the instigation of a certain officer, who wears red tabs, this very early call was directed to the window of a CEME of the far west—no names, no pack drill!

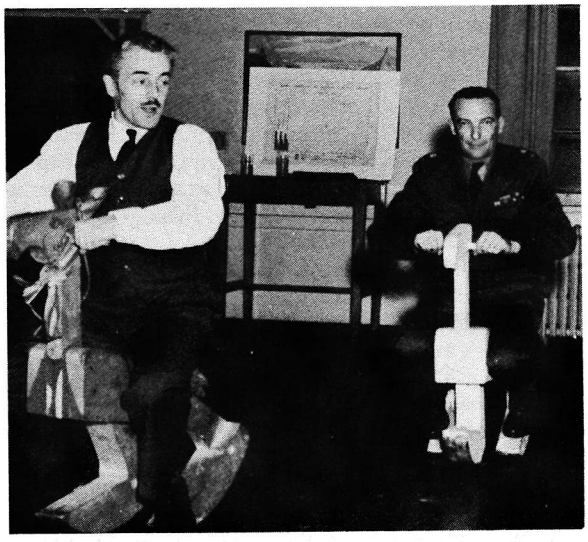
A ceremonial Retreat was staged at 1630 hrs the first day. This was very capably handled and the RCEME School band, composed of volunteer bandsmen who practice in their own time, deserve a great deal of credit for the excellence of their performance.

An inspection parade of 25 Canadian Support Workshop RCEME was held on the 17th. The Workshop troops were formed up in the Drill Hall and presented arms when the DME arrived at the saluting base. After the Director had inspected the troops they marched past in column of route while he took the salute. The men then broke off by Commands and met and talked to their own CEMEs.

A platoon of recruits who had just completed their nine weeks Basic Training put on a very precise display of drill.

The dining-in night at the Officers' Mess on the 17th was a treat to the unitiated. Very good entertainment was whipped up by the school staff on short notice—featuring Capt Tod Sloan, magician. Need we say more! Later in the evening, the guests were allowed a special treat, that of riding the pet ponies stabled in the Mess. These nefarious wooden contraptions—doubtless the product of some overwrought RCEME type who feels strongly for the horse age, or possibly conceived upon seeing our new badge—can actually be ridden. That was proved conclusively by certain of the hardier guests. We are inclined to say, however, that these pseudo horses can teach honest-to-gosh live ones some new ways of throwing would-be wranglers. We still sit down gingerly!

On the 19th the conference moved to AHQ where the delegates were addressed by the QMG, Brig Smith. Civilian personnel problems were discussed with Brig Chesley, VQMG, and Ordnance problems with Lt-Col J.R. Allen, ADOS (Mech). The conference concluded on 20 Jan with the feeling that this conference had been the best yet.



"RIDE 'IM, COWBOY! 202 BW rep leads the field in the CEME's Selling Plate.

RESERVE FORCE

5th Tech Regt

Last spring General Vokes persuaded H. A. Cooch, now Chairman of the Board, Canadian Westinghouse, that as an industrialist he should get a number of his company's tradesmen into the Reserve Force as members of a technical Corps. He pointed out the need for building up the RCEME Reserve Force so that in the event of mobilization the army would have the ready supply of skilled tradesmen that would be required.

The General asked Col Boehm, the DME, to go into the details of the problem with Mr. Cooch and obtain his support in building up the newly organized RCEME Reserve Force unit in Hamilton. With Lt-Col Mason, Command EME, Central Command, the DME discussed the situa-

Hon Lt Col Harold A Cooch
(Carey Studio)

Officers of the regiment (l to r): Capt N.W. Blakely; Capt Alex Anderson; Capt T.N. Christilaw; Major R.O. Cleworth; Capt D.E. Hazelton; Commanding Officer Lt-Col J.W. Anderson, MBE, ED; Capt F.D. Moffat; Major Harry Bullock; Lt J.W. Wallace; Capt J.M. Elliott; Lt J.E. Loughlin and Capt J.H. Coombe, CD. (Absent—Major A.A. McArthur.)
(Westinghouse News Photo)

tion with Mr. Cooch, emphasizing the following points:

(a) Industry should make its own mobilization plan by having as many of its personnel in Reserve Force units as practical, so if the time should come when these men are called up, industry will know in advance what men will be leaving and will be able to better plan its wartime production.

(b) In order to avoid wastage of skilled men who will join the army eventually, industry should be interested in these men joining RCEME instead of a non-technical Corps. If these men go to the non-technical Corps RCEME will still be forced to go to industry for the skilled men they will eventually require. In this way they will be losing two skilled men where they might be losing only one.

(c) The army will not have time to basically train tradesmen so it must obtain well qualified tradesmen from industry and teach them the military application of their trades.

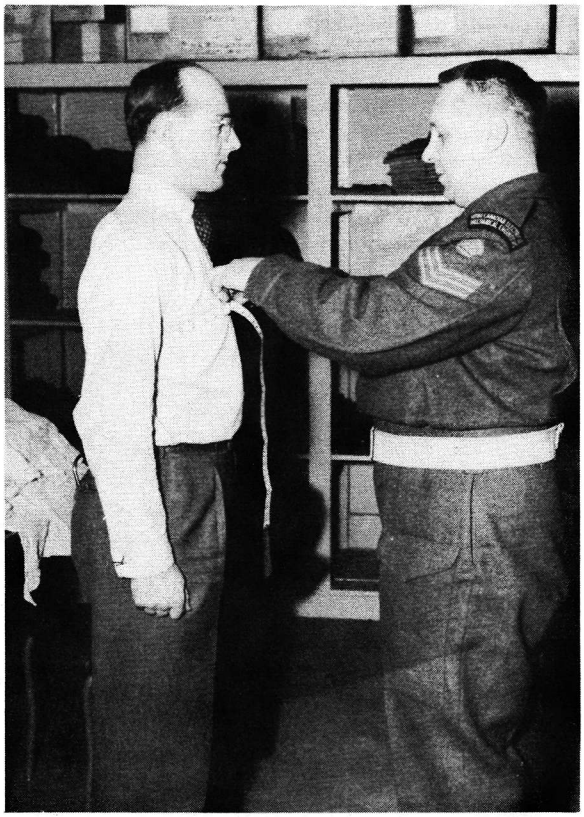
(d) The army, both in the Reserve Force and the Active Force will retain and perhaps improve the trades skill of their men.

(e) The economy of the nation cannot afford wastage of equipment through the inability of the army to maintain and repair it. It is important that RCEME have sufficiently well trained tradesmen to repair and maintain in a high standard of efficiency, the equipment made by Canadian industry rather than have it run into the ground and then require new equipment to replace it. For instance during the last war RCEME rebuilt 250 tanks in one week just behind the lines and so recuperated our losses which were greater than the intake during a period of heavy casualties.

Mr. Cooch became interested and formed the Industrial or 'grandfathers' Committee, comprised of leading Hamilton industrialists to advise and assist in the built-up of the newly organized 5th Technical Regiment. The members of the committee are: T. A. Rice, Vice-President of International Harvester Co, Vice-Chairman; R. M. Kelday, Presidential Assistant at the Steel Company of Canada; D. C. Gaskin, Vice-President and Managing Director of Studebaker Corporation of Canada; W. H. Funston, Jr, President of Firestone Tire and Rubber Co; F. A. Loosley, Vice-President, Dominion Foundry; R. S. Hart, President, National Steel Car; W. J. W. Reid, President, Otis Elevator Co; H. G. Thompson, General Manager, Alcan Ltd; C. O. Colbert, District Manager, Bell Telephone Co of Canada.

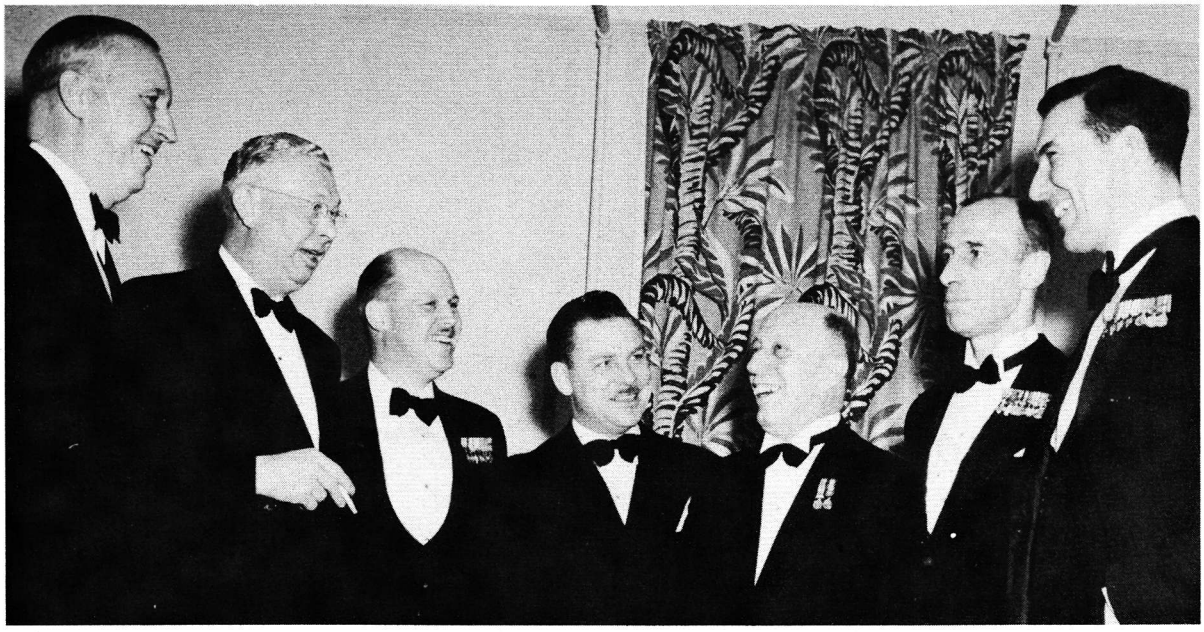
While the Industrial Committee was busy with personnel, Central Command HQ speeded up the provision of, and alterations to, the Otis Building on Burlington Ave; and DME hastened the provision of training equipment. The Command EME, Lt-Col H. L. K. Mason, worked with the committee and advised the GOC Central Command on the selection of officers made available from personnel in the large industries controlled by members of the Industrial Committee. This resulted in the transfer of Lt-Col J. W. Anderson from RCCS to become OC of the unit. Mr. Cooch was subsequently appointed Honorary Lieutenant Colonel of the regiment.

Recruiting for the unit was started coincident with the 'Voice of the Army' featuring RCEME on the CBC from Toronto on 7 Feb 1951. The industrial firms followed this up by bulletins and news items on their bulletin boards and in the company house organs.



S/Sgt Wm J. Bye fits Capt G. K. Phillips, Regimental MO, for a uniform.
(Westinghouse News Photo)

Sales Manager: "There's a fellow who's going places."
Secretary: "Ambitious fellow, eh?"
Sales Manager: "No. His wife is out of town."



Left to right: Mr. W. Clarke, Mr. E.C. Rowe, Col C.R. Boehm MBE, Mr. T. Rippingale, Mr. H.A. Cooch, Brig S. Todd CBE DSO ED, Brig J.A.W. Bennett CBE. (London Free Press Photo)

6th Tech Regt

Following up the success of 5th Tech Regt and the interest taken by the Hamilton Industrial Committee, Brig J.A.W. Bennett, Commander Western Ontario Area, entertained prominent London and Windsor industrialists at a mess dinner in London. To meet these men he invited Mr. H.A. Cooch, Col Boehm, Brig S. Todd, Hamilton Street Rly, Lt-Col H.L.K. Mason, CEME Central Command and Major D.C. Little, OC 6th Tech Regt.

The guests included Mr. T. Rippengale, GM Diesel Div; E.C. Row, Chrysler Corp of Canada; W. Clark, Ford Motor Co of Canada.

Mr. Cooch outlined the action he had taken to form the Industrial Committee in Hamilton and gave his reasons why industry there was so keenly interested. Brig Todd elaborated on this and showed how, from a military point of view, RCEME was so important to the entire army.

Plans were made for a meeting with Windsor industrial leaders to explain in more detail to a larger group the need for close co-operation with industry in building up the 6th Tech Regt.

Major Little was chairman at this dinner on 15 Feb and the speakers were Lt-Col Cooch, Brig Bennett and the DME. Mr. Cooch reaffirmed his statements made at the London meeting and stated, "We know from our early experience (in Hamilton) that we are going to avoid much of the confusion that existed in the last war. By this means we can add sanity to our recruiting program."

Brig Bennett pointed out that industry could either 'sit down' and wait for mobilization or act now so that if mobilization did come the least confusion and adjustment would occur. Col Boehm stated, "The Active Army is definitely looking to the Reserve Force units to supply the fine men required by full mobilization for every one now in the RCEME."

As a result of the meeting, the utmost support of the Reserve Force was assured. Mr. R.M. Sale, President Ford Motor Co of Canada voiced his feeling when he said, "There should be no hesitation in Windsor in stepping out and forming a committee."

7th Tech Regt

During December 1950, 7th Technical Regiment became a member of the Winnipeg Military Rifle Association, a branch of the Manitoba Provincial Rifle Association. A minimum requirement of 30 members exists and the unit has approximately 50 turning out for each Monday night shoot. A&T staff personnel assist in coaching and supervising the members participating which has proven a big asset to the teams. Competition is provided by

RESERVE FORCE CAMP

Aldershot N.S.

L/Cpl Kennedy, using a stripped vehicle as an instructional aid while giving driver maintenance instruction.

AWD of 200 Base Workshop, (l to r) Cfn MacDonald, Brommitt, Sgt Keating, Cpl Simson, WOII Armstrong, Cfn Harlow, Sgt Cline, Capt Roberts, Cfn Haney, WOII McKinnon, Cfn Ranger, Butler, McClellan, Rogers, Thorne.

RCEME instructional cadre. Front row: WOsII Vyyyan and Reynolds, Capt Roberts; WOI Gladwin and Sgt Hicks. Rear row: Sgt Lannan, Sgt Burgess, L/Cpl Kennedy, Sgt Sheehan, Sgt Ratto and Sgt Pineo.

other reserve units such as Queen's Own Cameron Highlanders, Winnipeg Light Infantry, Royal Winnipeg Rifles and others. With more practise the unit teams will show stiffer competition as interest is really keen.

The unit's annual Christmas party for all ranks was held on 20 Dec 50. Motion pictures and refreshments rounded out a successful evening and ended another year's activities. Best Wishes for the New Year by Major O'Neill, A/OC, concluded the enjoyable evening.

To expedite training, the building housing the vehicle equipment is being altered to form training bays. These bays when completed will simplify class control, grouping of equipment, and permit several lectures to be in progress at once. Although the program is just starting it is felt results will be worthwhile. To assist training it is hoped that further cutaway models and training equipment will be available, as visual aids increase many times the rate of learning.

Affiliated with 7th Tech Regt RCEME there is a school cadet copes from Provencher School, St. Boniface, and they recently brought to Manitoba for the first time the Earl Roberts Imperial Cadet trophy. This trophy is competed for annually by cadet rifle teams throughout the British commonwealth from scores shot by the teams on their home ranges. In 1949 a Montreal corps won the trophy, the first time in many years that it has come to Canada.

The boys, all age 17 or 18, use regular army .303 rifles and the Provencher cadets scores 312 out of a possible 320, at the St. Charles ranges in September. The practices fired include five rounds deliberate at 500 yds; five rounds while moving from 500 to 100 yds; five rounds rapid at 200 yds range and five rounds snapshooting at the 200 yd mark.

Left to right are Raymond Pelletier, captain, Albert Mainguy, Elmer Sokoloski, Raymond Duguay and Henry DeCuypere.

Cadet Henry DeCuypere scored a possible—80 out of 80; Elmer Sokoloski had 79; Raymond Duguay 78; and Albert Mainguy 75. Raymond Pelletier age 17 was the team captain. Brother Albert Laurin, the cadet instructor at Provencher School said, "A great deal of credit for their success goes to the coach, Capt M. M. Morgan, of the RCEME, a Bisley shot."

4th Tech Regt

Since moving into the new Armoury, 132 St. Patrick St, Toronto, in the spring of 1949, conditions for training have steadily improved.

The quarters gradually took on the appearance of a well organized workshop by the late fall or 1949. At the same time, thanks to a vigorous recruiting campaign, many new officers, NCOs and craftsmen joined the unit during this period.

For a time the unit operated on a Brigade Workshop basis, with attached LADs, which was not too convenient from a Command standpoint when the unit's whole time was devoted to training. During the spring of 1950, courses for driver mechanics and engine mechanics as well as GMT were carried out with fair success. Courses in armament, tels and welding were not possible at that time due to the problems of space and equipment.

In the spring of 1950, the unit was reorganized into the Technical Regiment system which appears to be particularly well suited for a training unit.

Four training squadron commanders were appointed, and all officers and NCOs were allocated to squadrons.

A Squadron, the tels, electrical, small arms and instrument groups, was particularly fortunate in having their quarters completely renovated by the Engineers early in the fall of 1950. It was then possible immediately to commence training in all of the above categories except instruments, for which little or no equipment or training data was available. The tels shop is now well set up with good equipment, adequate working space and a very keen group of personnel.

B Squadron, essentially concerned with B vehicles, simply carried on with its previous training program and at the same time arranged to pool its resources with C squadron for purposes of training.

D Squadron was able to set up courses in armament as well as machinist and welder cours-

es after the arrival of the machinery lorries. Arrangements were made with the composite garage to provide permanent space for the machinery lorries so that they can now be set up in a very few minutes on training nights.

In addition to the technical training, regular courses are conducted on Thursday evenings for junior and senior NCO qualification as well as recruit courses. The officers of the unit are studying for qualifying examinations to be held in the spring of 1951.

More equipment of various types is still urgently required, and it is hoped that this will be forthcoming in the very near future. In the meantime, the unit will definitely continue to expand thanks to the very fine nucleus of officers, NCOs and craftsmen, who are giving so much time to the work.

A new chapter in RCEME Reserve Force operations was successfully written on the weekend of 10 Feb 51. This was the occasion of 4th Tech's visit to 25 COD and 202 Base Workshop at Longue Pointe, Montreal. Also included in the tour was a visit to a sister unit, 3rd Tech Regt, with headquarters at Lachine.

In the spring of 1950 Lt-Col J. R. Dunlop, OBE, ED, in conversation with Capt R. Austin then of this unit, first broached the idea of a Montreal tour. The primary idea behind the trip was to give the officers and men a first hand view of the operations involved in a large workshop. It was also hoped that the methods used at 202 Base Workshop might provide some assistance in furthering our own training program. This has proved to be true and new ideas have developed as a result of the tour.

The party, under the command of Major I. Malcolm, numbered thirty-two all ranks. Every squadron was well represented and we can certainly say that everyone had a very enjoyable time. The 32 below weather of the 10th was more than had been bargained for but even this did not cool the spirits of 4th Technical Regt.

The tour proper began with an inspection of 25 COD. Considerable comment was aroused by the vast quantity and variety of equipment in those miles of shelves. Capt R. Hewitson, our attached Ordnance Officer, no doubt understood the complicated filing and cross referencing of various items but most of us were left more than a little bewildered. From the Ordnance Depot the tour moved over to the workshop. Lt-Col A. J. R. Stethem, the CO, made us very welcome and pointed out several interesting facts. Most striking of these was the position the Canadian army has attained with respect to Canadian industry, on which it no longer depends for the latest production planning, methods and procedures. Instead, the efficiency of army operations has now reached the point where civilian industry sometimes seeks the advice of the army. On the tour of the workshop the various squadrons were given ample opportunity to see at first hand the equipments they work with.

Sunday morning an unexpected visit was arranged, when the 3rd Technical Regiment at Lachine were our hosts. Their organization made WOI Harold Geddes rather envious. The unit has almost no limit to its available space or at least that's the way it appeared to Mr. Geddes. This concluded the tour and after expressing their thanks to all concerned, the regiment returned to Toronto.

26th Tech Sqn

On Saturday December 2nd, Major G. T. Burgess, Officer Commanding, wished bon voyage to fifteen warrant officers and NCOs from the Ottawa Reserve Force unit, who entrained for 202 Base Workshop at Longue Pointe, Que.

After an enjoyable train trip, during which QMS Bob Gates won a cribbage tournament, the party arrived at Montreal. The expected transport could not be located and one intrepid sergeant approached what he termed a 'cute little trick' and asked directions to the workshop. Whatever he found out, it was not directions to the workshop. In the meantime an old gentleman who bore a remarkable resemblance to the late Field Marshall the Hon Jan Christian Smuts approached the group and offered his assistance by giving the necessary directions. His appearance so intrigued S/Sgt Stan (Sad Sack) Davis, treasurer of the squadrons' Sergeants' Mess, that he invited the old gentleman to join the party for dinner.

Finally arriving at their destination, the group were taken in hand by WOI J. F. O'Connor and shown to their quarters. Later they were introduced to the Sergeants' Mess where they were entertained so lavishly that the members of the NCO shooting team were down one hundred points at the weekly shooting in Ottawa on the following Monday.

On Sunday the same Mr. O'Connor took the group for a tour of the workshop. The visitors were really impressed with the equipment and the appearance of the shop. The informative and instructive comment of their guide was a definite factor in making the tour a valuable lesson to these men of the Reserve Force and to say they appreciated it would be an understatement.

Those making the trip were WOsII Gates,

(Please turn to page35)

Some impressions of

Fort CHURCHILL

By CFN J.W. BARGHOLZ, RCEME

What impressed me most about Churchill were the contrasts and extremes that prevail: The long, cold and bright winter and the short damp summer; the dog team and the snowmobile; the towering bulk of the grain elevator and the low, flat buildings of the camp and town; a crumbling fort two centuries old and a modern army camp; the primitive Eskimo and the soldier with the latest scientific aids.

The real ruler there is old King Winter. He reigns for nine months of the year and defies you to ignore him. Even the great Hudson Bay lies ice-bound until late June. In the winter when you walk across the pressure ridges and see the fresh cracks in the snow you realize what a mighty battle goes on between tide and frost.

My first taste of life in the north came in September 49 when I was posted to Fort Churchill. Coming up by train the weather was warm and sunny. At The Pas, Man, (more noted than Churchill for cold weather) I saw the last of the farming country. The next day we passed through timber lands and the trees became progressively smaller until by the second day they had disappeared and we were on the barrens.

The barrens reminded me of the prairies, stretching for mile upon mile in a flat even plain. One half expects to see a windmill or barn on the horizon, but the only thing growing there is moss and more moss which to walk on is like a pile of well-rotted hay ground up and stirred. In some places it cracks open until it looks like a vast badly plowed piece of farm land. There are lots of lakes, their surfaces only inches below the surrounding muskeg.

The railroad runs for over 500 miles from The Pas to Churchill with hardly a curve or a grade. Evidently in building the bed they simply hauled in gravel, dumped it on the muskeg and let it go at that. The gravel keeps the frost in the muskeg permanently and provides a roadbed as solid as rock. I saw only a bit of snow fencing and I was told the snow plow had never yet gone all the way to Churchill.

The telegraph lines are carried on tripods instead of the customary poles because, where they wouldn't sink out of sight in the muskeg, the rock or frost prevents the digging of holes. In some of the small villages or camps of the section men, the moss has been scraped off leaving what looks like a concrete street, the underlying rock being so level and smooth.

Near Churchill we again came upon trees in sheltered places. Here the frost—the permafrost—never entirely leaves the ground.

On the last day going in we saw herds of cariboo. The southward migration had begun

and I understand that at the height of the movement they sometimes stop trains while they pass.

The hustle of the large modern railroad station at Churchill surprised me. It was jammed with villagers, construction workers, Canadian and American soldiers and Indians. All were out as usual to see who or what the train had brought from 'outside' or 'down south' as the rest of Canada is known up there.

The Churchill country has a long military history predated only by its religious and commercial history. The present-day camp is in strong contrast to the tumbled ruins of the old Fort Prince of Wales.

If we felt we lived an 'isolated life', we had only to think of the Royal Engineers building and manning Fort Prince of Wales more than two centuries ago. Far from their homes in England they really knew the meaning of the word!

The fort still stands across the river from the present town—although its walls were damaged by the cannon fire of the French who took and held it for a short time. It is a most interesting place to visit. In its day it commanded the mouth of the Churchill River and many of the old cannon are still in place, pointing out over walls 30 to 40 feet thick.

Shortly after I arrived several of us started out one day to visit the old Fort. We procured a motor boat and set off diagonally up the river to where the fort stands near the mouth. When we got into the open water the waves were high and the sight of huge breakers pounding on the rocks was not the least bit encouraging. At this point we decided our nautical knowledge was insufficient to put the boat in successfully so we regretfully turned about. It can, however, be reached easily in winter over the ice.

The town itself can boast of having been a commercial centre since 1717. In that year members of the Hudson's Bay Co built a trading post. Huge rings are still wedged in the rocks where they moored their boats so long ago, and carved in the same rocks not far away is the name and date 'SAMUEL HEARNE, 1767'. It was from there he searched for the copper that was rumored to exist along what was later known as the Coppermine River. Hearne also hoped to find the long-sought Northwest Passage.

The town of Churchill was named after a governor of the Hudson's Bay Company. It now has a population of about 800 people, but I doubt if it had 200 before the war as most of the buildings seem to be new. There are two horses and an uncounted number of dogs.

The principal buildings of the town are well scattered: two general stores, the Hudson's Bay Company, a hardware and lumber yard combined, two small hotels, three cafes, one taxi stand, a newly built school and combined barber shop

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and poolroom.

Elsewhere in this sidewalkless town are the Anglican and Catholic Missions, the post office, the Igloo Theatre (doubling for a dance hall) and a whale oil factory.

The railway and Harbor Board employ many men in Churchill and many more have maintenance or construction jobs with the Department of National Defence. The Chippewyan Indians and half breeds form quite a portion of the town's population. Besides hunting and fishing, they work at many odd jobs.

I spent a good deal of spare time at my hobby of photography. There were so many opportunities for new and unusual shots—the only drawback being the extreme cold. Through December, January, February and part of March daytime temperatures hung at 25 to 40 below. In addition there was always a wind. I didn't mind the cold too much, but my poor little camera often refused to function. The mechanism would freeze and when the shutter was tripped only the safety catch would click off. Later when the films were developed a large number —my best shots, I'm sure—were often blank. This was most annoying. On one occasion I took a whole roll of film of an Eskimo repairing his sled at the RCMP barracks in 35 below zero weather. I considered myself very fortunate because they come to Churchill only at odd times but—you guessed it—not one picture turned out.

Incidentally they have a most interesting way of making their 'komatic' (sled) run easier. They cook some porridge and plaster it about an inch thick over the 20 ft runners. When it has frozen they smoothe it with a home-made plane and then freeze a thin layer of ice over it all. I had read that they used mud for this so I asked the Eskimo why he used porridge instead. He said simply, "Mud hard to get".

As I mentioned before Eskimos do not stay around Churchill as the nearest hunting grounds are perhaps two hundred miles north. They are an intelligent race with strong mechanical abilities and despite their struggle for existence are always smiling and happy. The Eskimo calls himself 'In-nook', a man—a man pre-eminently. Those who know him say he surely deserves this title.

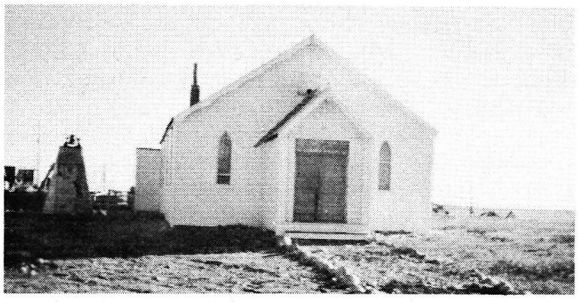
One of the first things you will notice as you approach Churchill whether by plane, train or boat is the great white grain elevator. It is so big compared to the other buildings that no matter from how far, or from what angle, you view it, it always seems closer than it is.

History tells us that the first white man to see the Churchill River was Jens Munck, a Dane, who wintered there in 1619. The chaplain of the expedition conducted the first Christian services and Munck received Holy Communion on his death bed in January 1620. To commem-

orate the bravery of these men a brass plaque, presented by the 'Friends of Denmark', hangs in St. Paul's Anglican Mission in the town. Not far from where Munck moored his ship over 300 years ago, great freighters from many foreign ports gather. Where he sought furs, they load grain from the prairies—at a saving of six cents a bushel over the all-rail route to Halifax.

The Anglican Mission has been active in the area since 1820 and the present church was erected in 1892. In 1927 the building of the harbour and elevator started a new community across the river about five miles away. So in 1936 the church was dismantled and taken across the ice by dog sled and rebuilt at its present location in town.

Game is abundant. Even the most humble can have ptarmigan in their pot every day. I have approached and taken pictures within twelve feet of them, so they should not be difficult to hunt. The white fox is also plentiful and quite tame as I saw them sometimes only a few yards from camp. They are the trappers' main livelihood. Cariboo, too, can be hunted in season within sight of camp. For a few days in the spring there were herds skirting the edge of camp at almost any hour, day or night, on their way north for the summer. The polar bear rarely comes this far south. In the springtime seals may be seen on the icebergs in the bay. As soon as the ice breaks up, in June usually, the white whales come up the river by the thousands. They are almost pure white and 15 feet long.



The winter of 1949-50 started about the middle of October. First the small ponds froze over and by mid-November even the mighty Hudson Bay was firmly shackled. From mid-November to mid-March temperatures stayed between 30 and 49 below night and day. These temperatures, combined with the ever-present wind off the ice, makes the parka, wind pants and mukluks the standard articles of wear for soldier and civilian, women included. During the winter the weather is even drier than on the prairies! I saw no hoar frost, or fog, at any time.

Almost every day after the weather got very cold, the sun shone brightly though briefly. Towards spring as the sun rose higher and higher sun glasses had to be worn if you were to be outside more than ten minutes.

I enjoyed a few weeks leave 'outside' in May, arriving back during June to do battle with the mosquito. Some say the reason there are so many mosquitos around Churchill is because the airstrip is the first one large enough for them to land on as they come down from the North!

As June passed the days grew longer and twilight met the dawn in the North. I spent the first of July taking pictures of the huge icebergs left on the beach when the ice broke up. The weather became warmer and damper during July. (It is these extremes of weather that make Fort Churchill ideal for testing Army equipment.) In August the black flies came to relieve the mosquitos. Which of the two is the worse nuisance, I have yet been unable to decide.

I left the North on the 17th of September. As the train pulled away I saw that the station platform was turning white from falling snow. King Winter was back.

(Photographs by the author)

St. Paul's Anglican Mission.

Hudson's Bay Co Store.

223 Workshop RCEME

S/Sgt Alex Jessiman and Sgt A. C. "Todd" Smithers, both of Ottawa, turn their backs on the $60,000 "treasure" they guarded at Connaught Rifle Ranges just long enough to pose for the Army photographer. The trophies—you count them—are competed for each year by top marksmen in the country at the DCRA annual prize on the ranges. (DPR (Army) Photo)

RCEME SHOOTS AGAIN

Personnel of the Corps again were well up in the prize lists at the DCRA Meet held at the Connaught Rifle Range (Ottawa) Aug 14 to 19, 1950. The Bren LMG Competition was won by a team from 213 Workshop Winnipeg, composed of Capt M. M. Morgan, Cfn N. N. Hirsch and WOII G. A. Knowles; 202 Base Workshop Montreal, was second; Cpl F. Jermey of 202 Base Workshop won the Bankers' with a 48 out of 50 at 300 yards and a possible 50 at 600 yards.

The highlight of the meet from the RCEME angle was probably the consistently good shooting of Capt M. M. Morgan, topped by his placing fifth in the Governor General's Qualifying Stage and 16th in the Final Stage. As a consequence he is eligible for the 1951 Canadian Bisley Team, as is Cpl F. Jermey who was on the team in 1949. An associate member of the RCEME School Rifle Team, Lt Ryan RCN(R), also made the team. Morgan and Jermey finished 40 and 44 respectively in the Grand Aggregate this year compared to 99 and 10 last year.

Cfn J. B. Robertson, 12 Coy Regina, shot so well in the meet (with one exception) that he was placed 16 on the All Comers' Aggregate (500 out of 530) and conceded a place on the Bisley Team by some 'experts'. However, the one exception was the City of Ottawa Match with ten shots at 900 yds (which has to be taken into consideration for the Grand and Bisley Aggregates) and here he had bad luck. He was a tyro member of the Prairie Command team that won the Jubilee Cup.

Capt Morgan, WOII Knowles and Cfn Hirsch were members of the HQ Prairie Command Team that won the City of Ottawa Cup (for teams).

Good scores were posted by WOI A. S. Etter, the School, in both the Tilton and the Connaught, when he placed eleventh and eighth respectively with 49s. Bud is no longer a tyro because of his 79th spot in the Grand Aggregate, a great improvement over his 197th last year.

Cfn Hirsch, high RCEME scorer (120) in the Macdonald, finished in eleventh place and Cpl J. B. Latulippe, 202 Base Workshop led the Corps in the Life Members Match, placing twelfth with a score of 45.

A Saskatchewan shot, Sgt J. R. Hardy of 211 Base Workshop Regina, in his first year of competitive shooting—he won the Green Shot Aggregate at Dundurn—made an impressive showing. Besides winning prize money in almost every competition, including the difficult City of Ottawa Match at 900 yds, he "shot himself right out of the tyro class" according to WOII Nicholson, a team-mate, "by placing 124 in the Grand Aggregate".

Cfn E. M. Cosman and R. M. Young, both of 202 Base Workshop, and Cpl M. V. Beatty the RCEME School, all improved their Grand Aggregate standing and by placing in the first 150 are also out of the tyro class.

Year by year electrical and mechanical engineers and craftsmen improve their scores at this Dominion wide match and give further proof that the best tradesman must first be a soldier.

	Grand Agg Standing	Tyro	Tilton	Connaught	Bankers	MacDougall	MacDonall	Life Members	City of Ottawa	Sherwood	Borden	King's Medal	Gov Gen Qual
		50	50	50	100	100	125	50	100	50	50	200	105
Morgan	40	-	*	47	93	*	114	*	78	27	*	*	103
Jermey	44	-	48	*	98	95	*	40	81	*	33	*	99
Woods	47	-	*	48	96	94	116	*	76	28	*	158	96
Etter	79	47	49	49	96	95	*	*	*	*	*	*	95
Cosman	81	-	*	47	94	96	113	*	78	*	41	157	95
Young	97	-	*	47	93	*	114	41	*	*	*	*	100
Beatty	106	-	*	48	95	94	113	42	*	27	36	151	96
Hardy	124	-	47	46	92	*	112	*	77	*	*	167	97
Nicholson	159	-	*	48	*	96	*	*	76	*	*	*	*
Hirsch	189	-	*	*	*	93	120	*	*	*	*	*	97
Robertson	193	47	47	*	95	95	117	40	*	*	*	*	101
Blake	197	-	*	*	93	*	*	39	*	*	*	*	97

* Out of the prize money, score not available.

PRECISION SQUAD

A platoon of recruits at the RCEME School demonstrating the standard of drill attained after eight weeks basic training, at the RCEME Conference. (l to r) Cfn Sulnierj, Langille, Graves, O'Brien, Klees McLean, Davenport, Falkner, Svendsen. Others in the platoon not visible are: Cfn O'Neil Head, Grist, Wood, Bona, Ray Smith, Boucher, MacNeil, D'Eon and Mathers.

CORPS ASSOCIATION

Major Jim Ramsey was elected chairman (1950-51) of the Niagara Peninsula Group of the RCEME Corps Association at the annual meeting held in the Officers' Mess at the Burlington St Armoury, Hamilton, Ont, 13 Oct 1950. Other officers elected were Major Bill Braden, Vice-Chairman; Capt Bill Bland, Secretary; Lieut Jack Elliott, Treasurer; Lt-Col Bruce McAdam, entertainment and programme committee; and Major Bill Thompson, Chairman of the contact committee, assisted by Major Bob Mitchell, Capt Bill Bland and Lt-Col Alex DeMaio. There was considerable discussion at the meeting on the formation of a Hamilton group of the association; however, it was decided not to form such a group, and that Hamilton members remain as members of the Niagara Peninsula Group.

Lt-Col J.W. Anderson, MBE, ED, told the meeting of the formation of the 5th Technical Regt, RCEME in Hamilton, and spoke enthusiastically of the organizational work done so far, and of the magnificient co-operation the unit was receiving from the Industrial Committee and leaders of industry in the city.

Lt-Col King Mason reported on the situation regarding the RCEME reserve unit in St. Catharines. He stated that negotiations were under way in Ottawa for the purchase or rental of a suitable building for the new unit.

The Niagara Group held their Second Annual Dinner Meeting, Friday, 16 Feb 1951, in the Recreation Hall of the Ontario Paper Co Ltd, Thorold, Ont. The dinner was arranged through the courtesy of Lt-Col Bruce McAdam. Toronto Group members were invited as guests of the Niagara Group. Lt-Col Sam Hughes, a charter member of the Canadian Intelligence Corps, gave a very interesting and enlightening talk on the organization and operations of the Corps during World War II.

Head table guests in addition to the speaker included Brig G.M. Grant, Col C.R. Boehm, Col T.M. Medland, Lt-Col King Mason, Lt-Col F.J. Lyle and Major A.J. Ramsey.

Special guests included Major C.R. Davis, Brig Secord, Lt-Col LeSueur Brodie, Col G.W. Beecroft, Brig H.B. Keenleyside, Lt-Col J.K. Bradford, H/Capt F.G. Stewart, Lt-Col R. Boak Burns, Major T.G. Street, Lt-Col J.K. Bell, Lt-Col W. Coolin and Lt-Col M. Robertson.

On Bruce McAdam's very kind invitation, the gathering adjourned to the McAdam household in Fonthill where further refreshments awaited. Old acquaintances were renewed and a wonderful time was had by all.

A special vote of thanks was extended to Bruce McAdam whose limitless energy and hospitality made this annual event a huge success.

The January meeting of the Niagara Group was held Friday, 12 Jan 1951, in the Officers' Mess of the Lincoln and Welland Regiment (St. Catharines Armoury). This meeting took the form of a short business session followed by US Army motion pictures of combined operations in the Pacific during World War II.

A group at the Fifth Annual Meeting RCEME Corps Association 21 Oct 1950.

The annual winter executive meeting of the RCEME Corps Association was held in the 4th Technical Regiment Armoury on Saturday 24 Feb 51. There were present eight members of the executive committee to carry on the business of the meeting under the chairmanship of Brig G.M. Grant. In spite of a very heavy schedule the DME, Colonel C.R. Boehm, sat in on the greater part of the meeting.

At lunch time Brig Cumberland addressed the executive and congratulated Brig Grant on his recent election as vice chairman of the Conference of Defence Associations. This appointment is indeed a great honour to both Brig Grant and the Corps as a whole, for it is indicative of the acceptance on the part of the other arms and services of the competence and vitality of our young Corps.

A brief discussion on the formation of Ladies Auxiliaries took place at the executive meeting following a recommendation by Col Boehm. It was felt the aims and object of such an associations should be: first, to take care of the needs of our troops in RCEME formations now in overseas theatres, and secondly, to form a basic

(Please turn to page 45)

ARCTIC RECOVERY

By WOII R. F. CONWAY, RCEME

In the final stages of the 1950 Arctic Instructor's Course held at Fort Churchill, breakdown of snowmobile penguins on the 'trail' caused certain of these equipments to be left behind when the personnel returned to Camp. Despite the efforts of Cpl Endall, RCEME, attached to the scheme as vehicle mechanic, four penguins and two tactical sleighs had to be abandoned and later recovered by 223 Workshop, Fort Churchill. The recovery was carried out in weather ranging from -8° to -17° with winds of from 15 to 30 mph, hampered by snow drifts ten to twenty feet deep.

The vehicles required for the recovery operation consisted of two D7 Caterpillar tractors, one penguin for reconnaissance and a wannegan for living accommodation. These vehicles were brought into the shop on Tuesday morning, 12 Dec, and serviced; provisions and fuel for a three day operation were loaded. The writer, newly arrived at Churchill, was given charge of the detail and chose for the recovery party Sgt Barrett, Cpl Endall, L/Cpl Miller, Cfn Prahm and Mr. Sabourin, the latter going along as cat operator. The American Army Test Team supplied one D7 and Pfc Sharpe, a very able cat operator known locally as 'The Chief'.

The entire party left the workshop at 1400 hrs the same day, and within two hours were caught in the beginning of what proved to be a three day snow storm accompanied by winds of approximately 25 mph. The wind and drifting snow completely obliterated the 'trail' and consequently a new route had to be broken. This of course slowed progress to a snail's pace and by evening, only eight miles had been traversed.

On Wednesday morning the first casualty, a penguin, was located and the party stopped for several hours in order to free up fuel lines and make this vehicle serviceable. Since the No. 52 wireless set in the wannegan had become inoperative and Sgt Barrett's services were no longer required, it was decided to send him back to Churchill with the now serviceable penguin. Although inexperienced in driving penguins, Barrett made very good time, arriving in Churchill in about two and a half hours.

The entire party then moved on to Norton Lake, approximately thirty miles by trail from Fort Churchill and it was decided to use this point as the base for future operations. The camp site was cleared and the wannegan set up on a permanent basis and, after a good meal cooked by Cfn Prahm, we crawled into sleeping bags for some much needed rest.

Thursday the storm continued and a few unsuccessful recces made us realize that more than the anticipated three days' supply of fuel and food would be necessary. The workshop, with whom we were in constant radio contact, was notified of the situation and Capt Otto arranged with the RCAF to fly supplies out to the lake as soon as weather conditions permitted. Thursday night and Friday morning, an air strip 2000 feet by 50 feet was cleared on the lake, by tractor, and was completed by 1000 hours Friday when a Norseman with S/L Black and F/L Weir flew in a supply of petrol and diesel fuel. Two more flights were made to complete the supply of rations and POL.

The RCAF proved invaluable in 'spotting' two of the penguins located within a radius of eight miles of Norton Lake. The remaining one was located by Conway, Endall and Prahm in the recce penguin. The axles were removed and a tow cable was attached. We soon had all three ready for tow and then despatched the 'chief' with a D7 to pick up one of them and Mr. Sabourin with L/Cpl Miller to get another. To pick up this second penguin proved somewhat difficult as it was stranded out on the tidal flats on the shore of Hudson Bay. The tidal flats would not support the weight of the D7 and consequently an entirely new route to and from the campsite had to be picked out. Although this vehicle was only five miles from our campsite, some six hours were required to get it in. On Sunday morning, the 'chief' and Cfn Prahm were

Tractor train.

sent with a D7 to pick up the remaining penguin; a round trip of approximately eighteen miles requiring nearly all day.

While these two were away, the campsite was cleared and all equipments moved across the lake in preparation for an early start for Churchill on Monday morning.

We started out early with everything in tow and made good progress for about fifteen miles until we got into some very deep snow drifts and had to cross a long series of 'niggerheads'. (These are perpendicular hillocks of hard earth and rock, about two feet high, one to three feet in diameter, irregularly spaced from two to six feet apart and almost impossible to navigate with sleigh runners.) After considerable winching and bulldozing, we were within six miles of our destination by 1800 hrs.

We decided to have supper and then continue into camp, expecting to arrive about 2300 hrs but Fate soon changed our plans. After being on the trail about an hour after supper, the steering clutch on one D7 seized and remained non-serviceable despite our efforts to free it.

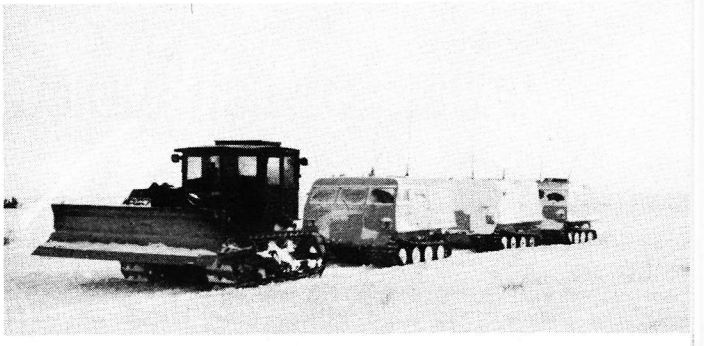
The penguin was sent to the workshop and another D7 was brought out to complete the tow back to Churchill. We arrived without further incident at 0630 hrs Tuesday, 19 Dec, within a few hours of one week away. This completed, (so we've been told), the longest recovery job undertaken by army personnel in the north country.

The complete operation required forty mandays in all which, under normal weather conditions, might well have been cut in half or even more. However, when forced to work in awkward clothing and to use tools while wearing large padded mitts, it is easy to see where the time is lost.

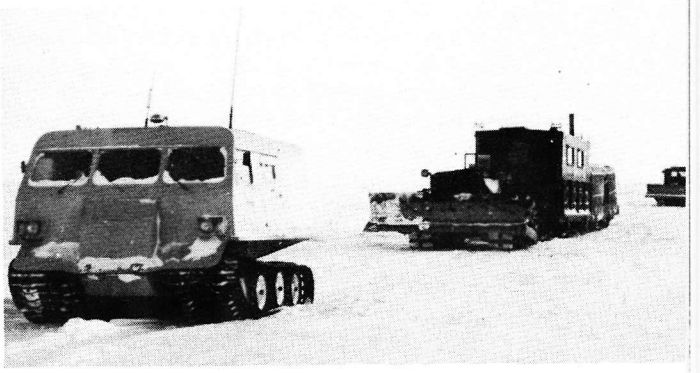
In addition to the problems concerning working conditions, there is the matter of housekeeping which, on the trail, seems to be one of the greater headaches. Future operational parties of this nature should take along one man primarily for cooking, washing dishes and all the other household tasks. If it's true that 'an army travels on its stomach' it's doubly true in the north where every effort demands so much energy: and to have energy requires lots of good palatable food.

FIRE AT MILE 300 NWHS

The Workshop at Fort Nelson (No. 223) suffered a very devestating setback on the night of 28 Jan when building 13 was totally destroyed by fire. This building housed three vital ancillary sections of the shop, the machine shop, the welding shop and the electrical section, plus all the stock of steel, brass and material used by these sections.



A US Army D7 and three casualties.



Homeward bound—the complete tractor train.

RCEME D7 and Wannegan; driver, Ed Sabourin.

Refuelling the 'recce' penguin. Left to right: Cfn Prahm, WOII Conway, Cpl Endall.

THE DME ADDRESSES THE ASME

"There are all kinds of engineering tasks in a modern army..... which, because of the great weight of technical weapons and equipment now used,..... made necessary the organization of..... the Royal Canadian Electrical and Mechanical Engineers," said Col Boehm addressing the Ontario Section of the American Society of Mechanical Engineers in Toronto 14 Dec 1950.

The speaker then explained the functions of the Corps and illustrated the tremendous quantity of electrical and mechanical equipment by pointing out that the vehicles required by a corps consisting of one infantry and one armoured division would stretch along the highway from London (Ont) to Montreal.

The army's repair work has to be done under all conditions. The tradesmen work in modern buildings built to the latest specifications; they work in drill halls and requisitioned garages; and they work in the standard mobile field workshop capable of operating anywhere a vehicle can go.

One example of complex equipment is the radar-controlled anti-aircraft battery. Approaching planes can be detected at long range by a tactical control radar, identified electronically and, if unfriendly, followed to within range of the guns. The location of the enemy aircraft is then automatically transferred to a fire control radar capable of accurately determining the present range, bearing, and angle of sight to the aircraft. An automatic following device incorporated in the fire control radar 'locks' the radar on the target and thus a steady and continuous record of present target position is available to the electronic predictor which instantaneously converts this information to the future target position required by the guns. This is a highly complicated procedure and is determined by the ballistics of the gun, meteorolgical conditions, and the speed, altitude and course of the aircraft. Continuous following of the target by the guns is controlled automatically by the information supplied from the predictor, and the automatic loading and firing mechanisms facilitate a high rate of fire until the enemy is destroyed.

Waterproofing of vehicles is another engineering problem the army has had to tackle. For the Normandy invasion all wheeled vehicles for both the assault and the follow-up forces had to be prepared to proceed ashore through almost four feet of salt water. The REME assumed this work and the RCEME took on the responsibility for waterproofing vehicles of Canadian manufacture. During the actual invasion losses due to failure of waterproofing were approximately 0.2%.

A current problem of interest to the automotive industry is the method developed since the war to preserve vehicles in storage. It was decided to preserve certain equipment for future use of the army under the following conditions: (a) outside storage in all weather; (b) minimum maintenance work; (c) minimum disassembly; (d) movable on own wheels and (e) minimum work to prepare for issue. Vehicles crated for overseas shipment were found to be deteriorating rapidly, so had to be made into 'runners' which were eventually blocked up on hard standing.

The vehicles were preserved for a three-year period, known as 'long term storage'. Twice a year the engine and power train are turned over by a portable power unit. At the end of the three year period certain preservatives will have lost their efficacy and will be replaced.

Canadian army workshops are required essentially to train and to keep in training tradesmen soldiers, but much useful work is being done which helps to offset the cost of military operations. The manpower allotted to RCEME must be trained as a highly skilled nucleus capable of expansion, with the addition of the Reserve Force, into a powerful service. A system of training has been set up which makes the army tradesman as highly skilled and experienced, by the time he becomes a 'tiffy', as his counterpart in civilian life.

(EDITORIAL continued from Page 3)

rect technical advice is passed unhesitatingly to GOsC and users alike. These things should be accomplished without fanfare, and RCEME should be unnoticed in the execution of its duty, for delays call attention while prompt service is, in normal circumstances, accepted without comment.

This, then, is the target. Let us see that we strike it without miss or magpie, despite the occasional gross technical or mechanical misdemeanours of our clients.

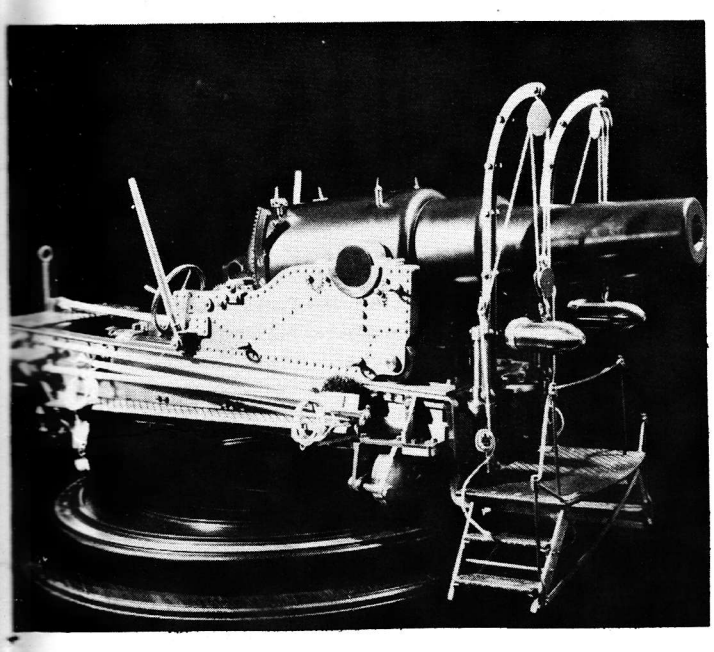
All the articles in this issue have been written by RCEME personnel especially for the RCEME Quarterly.

The RML 9 inch

by LT COL H. G. F. MORGAN, MBE, RCEME

The RCEME School has been most fortunate in having presented to it the model illustrated on this page. The donor, who is also the manufacturer of the model, is Lt-Col S. J. Montgomery, Professor of Mechanical Engineering, NSTC, lately RCEME, of Halifax. The model is strictly to 1:20 scale, and the craftsmanship by Col Montgomery is indeed a joy to behold. The model is on permanent display in the Officers' Mess at the RCEME School.

Lt-Col Montgomery has followed precisely the blueprints of the original manufacturers of the Gun RML 9-in Mk IV Coast Defence. Even



the threads of the bolts on the model are fine Whitworth. Actually, these were the only items not handmade by the colonel, but were imported from the UK especially for this purpose, as the pitch of the thread coincides with the original threads when scaled down. The barrel, as in the original piece, is made up of shrunk bands; in the model, out of mild steel. It was finished in the Armourer's Shop of 200 Base Workshop, RCEME, Halifax, by browning to prevent tarnishing, and as a contrast to the rest of the model.

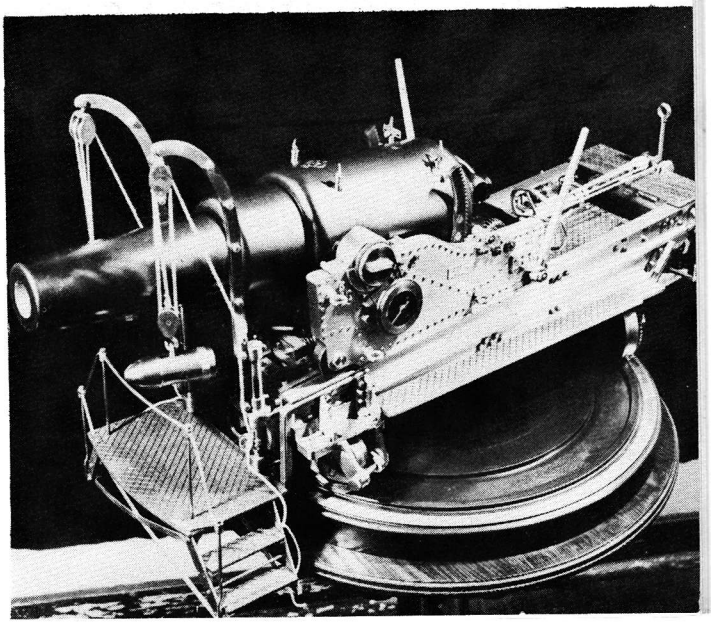
The mounting and other parts are in bright metal, lacquered with clear varnish. The rifling of the barrel has four grooves, and Col Montgomery cut the rifling in a lathe using a wedge, the taper of which was calculated so that the twist of the rifling corresponded to that of the parent gun.

The wooden portions of the model are from a step of the original gun at York Redoubt. The Royal Cipher on the top of the barrel is exactly the same as the Cipher on the original piece, and was hand-engraved by WOI Gladwin of the Halifax Workshop.

It has been calculated very approximately that Col Montgomery put in no less than 4000 hours of work on the model; the finishing touches were given by 200 Base Workshop. Net weight of the model with track is 125 lbs, as compared with 18 tons for the original piece, and 12 tons for the carriage.

This coast defence weapon is a most interesting example of design thinking in the transition stage between muzzle loading and breech loading armament. It may in fact be said to be the last and best of its line.

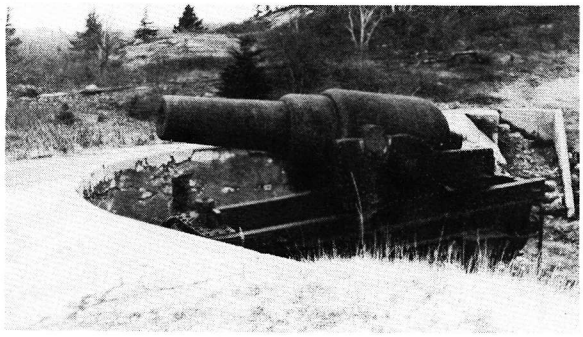
The 9-in rifled muzzle loading guns were similar to 12, 10 and 7 inch calibres. They were constructed between 1860 and 1868, and actually replaced breech loading guns which apparently had not been found satisfactory, the design for the larger calibres going back to rifled muzzle-loading. They were declared obsolete in 1904-1905, and were last fired in the British Empire in 1912. The range of the 9-in RML gun was roughly 8,000 - 8,500 yards, the muzzle velocity was approximately 1,440 feet



per second, and it was stated that the armour-piercing shell was capable of penetrating ten inches of wrought iron at 1,000 yards. The rate of fire was about one round per four minutes, which was satisfactory against slow sailing vessels, especially if the opportunity were taken to fire at them while they were going about. In the United Kingdom, target practice was sometimes carried out against a horse-drawn target on a distant beach. The guns were never fired in anger: as in all coast defence in Canada to this date, coastal artillery has acted as a deterrent to the enemy because in a shore-to-ship engagements, the ship always comes off second best. Effectiveness, say coast defence gunners, may be expressed as: shore to ship - 75% hits; ship to shore - 2% hits. The moving platform accounts for this spread.

The recoil system merely arrested the recoil, and there was no recuperator, the run-out being effected by gravity. When the gun was raised off the inclined guides, it ran forward to the firing position. This raising was carried out by the cams and levers shown on the model. The recoil system is complete in detail on the model and, of course, to scale. So are the buffer springs, which cushion the effect of the run-out. These can be seen in the photographs. The propellant was a fifty pound 'prism powder' cartridge, with a friction tube to ignite the charge through a touch-hole. The 'prism powder' used as propellant was gunpowder pressed into an octagonal form 2-in across flats and 1-in deep. The shell weighed 256 lbs. It was lead coated and studded with four studs, which filled the four grooves of the rifling. A gas check loaded with the shell came in contact with the base of it. The shock of the discharge caused the gas check to produce obturation, and rotation was imparted to the shell by the studs following the rifling of the barrel. There were several types of shell, including shrapnel, star or illuminating shells, and case shot.

WO II J.E. Peacock alongside 9 in gun to show comparative size (RCN photo)



Parapet, showing gun almost in loading position (RCN photo)

The gun crew was made up of thirteen men. The cartridge was placed in by number 2 and rammed home by numbers 2, 4, 6 and 8 on the left, and numbers 3, 5, 7 and 9 on the right. The shell was brought up on a barrow and lifted with a derrick by having the shell slung in a rope sling or selvagee. This was removed when the shell was half inserted into the muzzle. The projectile was centred so that the studs were in alignment with the grooves of the bore, and the shell was rammed in by means of the rammer, which had a freely rotating bronze head, and forced back against the gas check and cartridge. The gun was then 'run up' (to what we would call the fully runout position): numbers 2 and 3 applied iron shod levers to the wheels, and on the word "Lower", the breech end of the gun was raised and rested on metal rollers. Gravity caused it to run forward to the firing position against the cushion of the spiral springs. The gun layer passed the 'pricker' down the vent, thus breaking the covering of the cartridge, and inserted a 'friction T' tube in the vent and attached his lanyard to the tube. He aligned his sights on the target and when he was on, number 1 signalled the gun group commander. The guns could be fired singly or in salvo. The latter was introduced about 1900-1903, the gun being fired by 'tubes electric vent scaling T', with the electricity obtained from Daniel or Leclanché cells. A type of horizontal position finder was used in conjunction with the batteries to give the range. After firing, the bore was thoroughly cleaned with a wet sponge.

The photographs accompanying this article show some of the guns of this type which are still to be seen in Halifax at York Redoubt, which has been a fortified area since the early nineteenth century. It was originally a Signal Station and, at the time that the guns were operational, the fortress system also included batteries at the Citadel (Fort George), Fort McNab, Ives Point, and Fort Clarence on the east side of the harbour, and George's Island approximately in the centre of the harbour.

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(RESERVE FORCE continued from page 22)

Laing, Pushman, Westcott; S/Sgts Davis, Riendeau; Sgts Carrierre, Denomme, Gravelle, Landry, Laplante, Robillard, Sauve, Thornton and Wittenberg.

The visit was arranged through the efforts of Capt H.H. Erb at DME, Army Headquarters, and the good offices of Major L.B. Screaton of the Base Workshop. Of course it was all done with the approval of Area and HQ Central Command.

Many thanks to 202 Base Workshop for your kindness and hospitality.

39th Tech Sqn

On the 9th December 1950, in the vicinity of Blairmore in the Crowsnest Pass, Alberta, a loaded oil tanker went out of control, overturned, and stopped three feet short of a seventy-five foot embankment. Blairmore, a typical small country town, does not possess civilian recovery equipment sufficiently powerful, nor skilled recovery personnel to cope with such a situation. The photographs show the tanker casualty.

However, No. 1 Recovery Troop of the 39th Tech Sqn is located at Blairmore, and Sgt Charlie Hetherington and his Mack were called to the scene. Within an hour and a half this tricky recovery job was completed. The trailer was anchored fast and the tractor recovered first. The tractor and the trailer were both recovered using a 3-1 hitch.

On this occasion the Army - and RCEME in particular - were instrumental in eliminating a potential fire hazard, and a danger to civilian personnel attempting to carry out the job with inadequate equipment.

By this action it did more to cement good relations between the civilian population and the Army than, says our correspondent, any Army advertising programmes so far carried out in this area.

Sixty members of 6th Tech Regt took part in Remembrance Day parade at Essex.

Last August, the Red Cross announced it was anxious to get some organization to recondition a large quantity of toys for re-issue to the children of needy families. We took the matter up with our officers and NCOs and decided it would be a good gesture on our part. We notified the Red Cross and they were very grateful for the offer of help.

By the latter part of September we had a whole back loading point set up and there was a big pile of toys of all sorts and every condition. We organized a few weekend work bees and waded through the mass of toys. The Cadet Corps did a number of the easier jobs and quite a lot of the painting. The Reserve Force boys did the rest.

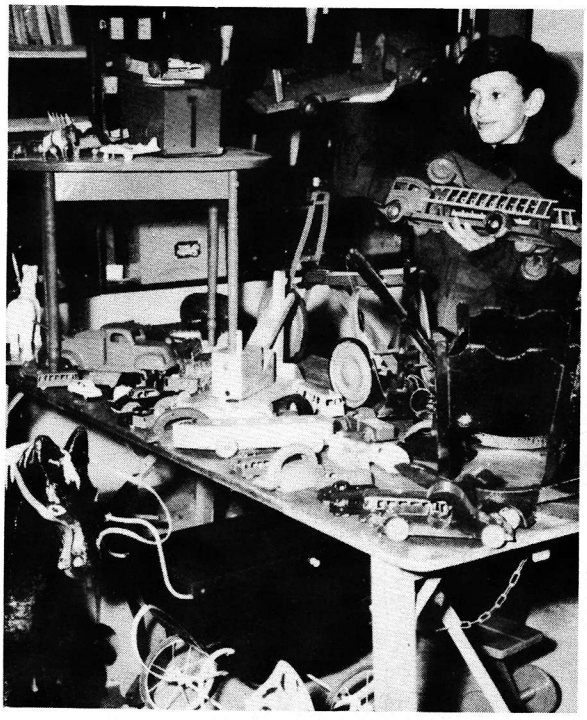
The project was very successful and the unit received favorable publicity from it. The boys, both in the cadets and reserve unit took to the scheme very willingly and undoubtedly it did a lot of good for the morale of the unit.

-W. E. MacInnes Lt-Col
CO 8 Technical Regt RCEME

Left to right: Cfn W. R. Margah, I. M. Fleming, W. W. McIntosh and Cpl F. Flyman.

Cfn G. H. Gordon

Cadet F. Flyman



THE CASE OF THE MISSING NAIL

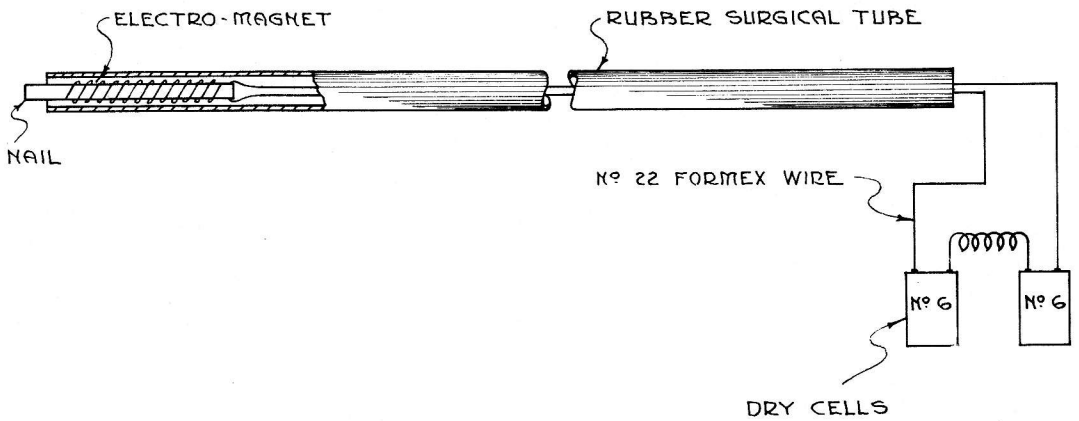
by MAJOR M.A. REID, RCEME

On Sunday 24 Dec 50 Major R.C. Elliott, my next door neighbour dropped in to see me. Bob is officer i/c surgery at Fort Churchill Station Hospital. He greeted me with the following remarks "Bud, I have a little girl over in the hospital who has swallowed a nail. Can you make me an electro magnet that I can insert by mouth and pull the nail out".

Electro magnets are not my strong point, especially on Sunday mornings. However, I thought we might apply the basic principles of electricity and make up a test magnet in the house. So with the aid of a transformer from an electric train, a nail and a few turns of wire, we constructed a small electro magnet but the voltage was too high and we burned the insulation off the wires. It was obvious that a lower voltage was required because a hot wire in the stomach would probably cause more damage than the nail.

Having decided that it was probably feasible to construct this gadget, Bob further added to my troubles by stating that this whole device must be inserted in a small rubber tube about three feet long.

I contacted Sgt Barrett and we proceeded to the workshop. We took a nail approximately 1/8-in in diameter and cut it down to 1 1/4 in length. We then took some 22 gauge formex wire and wound on twenty turns leaving about 3/16 of the nail uncovered at each end. After attaching ten feet of wire to the leads we tested it first with one No. 6 dry cell and then two in series. This latter arrangement worked perfectly, provided a strong magnet and did not heat up. The problem now was to get the magnet and the leads inside the Gastric Levine Tube which the medicals had provided. This tube is three feet long and has an inside diameter of approximately 3/32-in. With a considerable amount of coaxing we managed to insert the magnet and leads into the tube, leaving 1/8-in of the magnet protruding. It was then tested once more, found satisfactory and rushed over to the hospital. At the hospital it was tested and was found strong enough to pull a nail through some heavy jelly on a piece of gauze.



An hour later the operation took place; the patient was given an anesthetic and the magnet was inserted. The travel of the magnet was followed with the aid of a fluoroscope but when the magnet reached the stomach, it was found that the nail had passed on into the intestine and we were unable to follow it.

Although the operation was unsuccessful the little girl eventually passed the nail anyway.

The medicals kept the gadget and Bob states it will no doubt prove useful in removing such items as nails, pins and other ferrous items which children have a habit of swallowing. It is possible that this RCEME device may have some practical application in medicine.

EXCHANGE POSTING in UK

by MAJOR V. W. BETHEL, RCEME

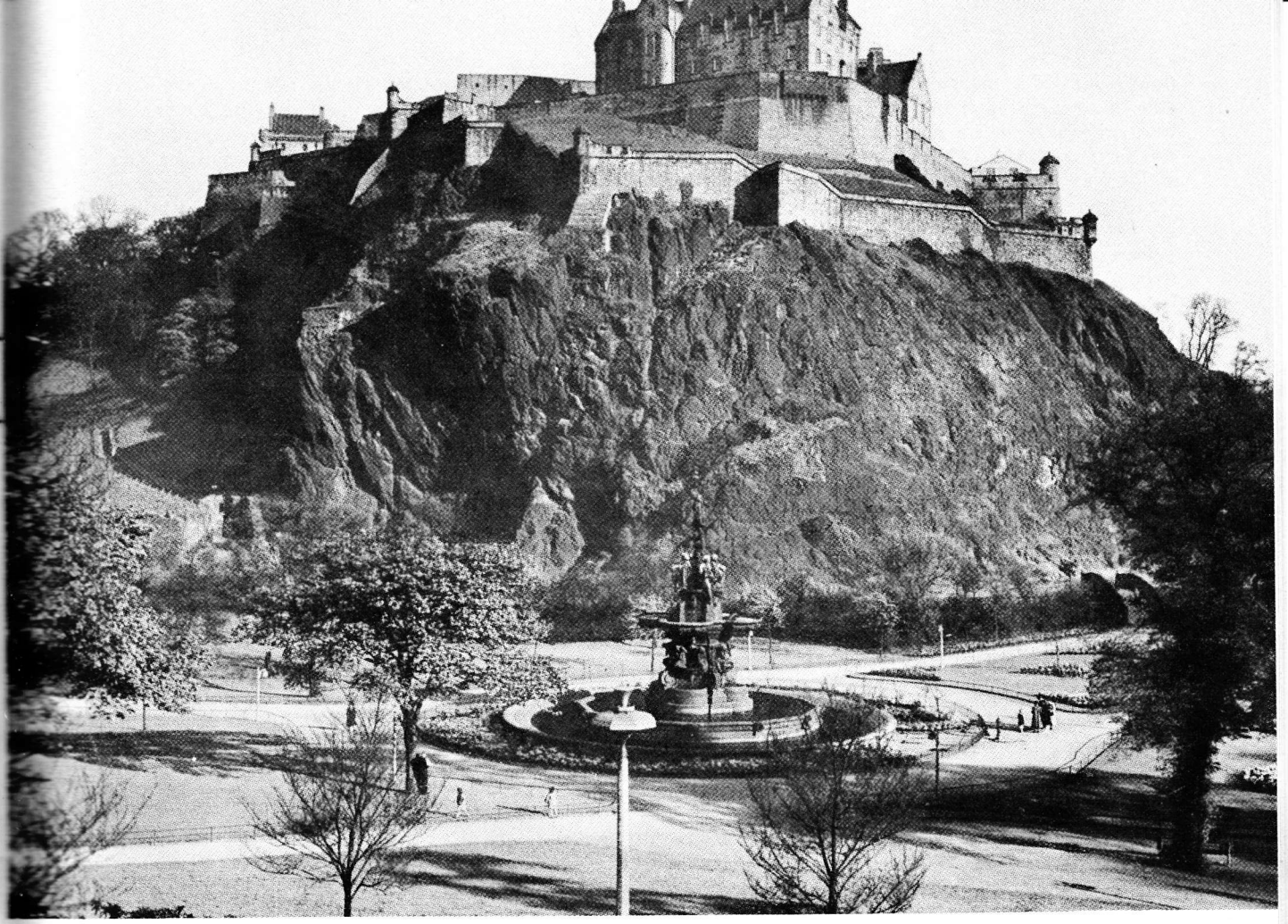
On completion of the 2nd TSO Course in 1949, I was privileged to spend a year with AA Command in the UK as an exchange officer. In preparation for the posting, I had spent six weeks at an AA Group Workshop REME in the South of England and so was fairly familiar with some of the problems which I would encounter on assuming my duties.

The posting to 3AA Group Headquarters near Edinburgh placed me in the most northerly of the five groups which comprise AA Command. Number 3AA Group includes Scotland, Northern Ireland and a part of Northern England and is responsible in conjunction with the RAF for the anti-aircraft defence of this area.

Number 3AA Group, like the other AA groups, is commanded by a Major General who is assisted by the usual G, A & Q and service staffs found at such headquarters. The REME services in the group are controlled by an ADME, and it was my good fortune to be employed as DADME (Tech) and to be assisted by a capable and versatile staff.

One of my first visits was to the group workshop which like the headquarters is situated on a large estate near the Firth of Forth. The 3AA Group Workshops, is able to repair all guns, small arms, instruments, vehicles, searchlights and fire control equipment used in an AA group. Personnel are drawn from both military and civilian sources and form a comprehensive team.

The high humidity typical of Scotland provides few problems which are not met elsewhere



Edinburgh Castle Rock and the Fountain in West Princes Street Gardens.
(The Scotsman)

in the UK, although rusting is particularly difficult to prevent on even protected surfaces; and the interior of gear boxes and other surfaces which are not immersed in oil suffer rapid deterioration.

For a few weeks during the summer I had the pleasure of acting as CO at the workshop, and found this period to be one of the highlights of the tour. The satisfaction which comes from successfully diagnosing and rectifying a fault, or from successfully meeting a problem in repair, is not readily equalled in a headquarters office.

An equally interesting part of the tour resulted from the task assigned to me for the annual mobilization exercise. The scheme was named 'Exercise Madhouse', a name which seemed aptly descriptive to some of us who participated in it during the hectic week in June when the group activity reached a new high mark. The object of the exercise was twofold: first, to explain to Regular and Territorial Army officers of the group what they would have to do in the event of mobilization—by means of lectures, a playlet and demonstrations; and secondly, to test our local mobilization plans by putting them into action on a limited scale. I was honoured in being chosen REME umpire and so had an unequalled opportunity to observe our plans in action. As is usually the case in such schemes, the best remembered moments are only incidental to the main problem—as when a gun broke loose from the towing tractor on a hill and came rolling back towards the cars following behind. The Austin sedan immediately behind the gun suddenly seemed to erupt, I remember, as its load of officers scattered from in front of the ten ton gun which was quickly gaining speed during the time required to cover the short distance to the car. No one was hurt, however, and the

The Firth of Forth at Blackness Castle, West Lothian. The Forth Bridge is in the right background. In the left background is Rosyth Dockyard.
(The Scotsman)

Austin served admirably as a road block for the gun to prevent it from rolling over the fifteen foot embankment or continuing on its way towards those of us behind. Needless to say, the sedan was BER, and bore slight resemblance to its original shape when the dust had settled.

Some interesting problems presented themselves during my tour and fully exercised the ingenuity of the staff. Our solution of the problem of moving a radar through a drill hall doorway that was considerably too small provided much interest for the local Edinburgh children and served to demonstrate the success which results from Scottish tenacity combined with the power of a Scammel. The doorway was officially enlarged by the Public Works a few weeks after this particular task had been completed, much to our disgust!

We had some unusual recovery problems too—as when HAA guns and tractors seemed fated to end up at the bottom of river gorges instead of at the designated unit. For two weeks it appeared as if the fates had decided that no gun would travel south from Glasgow with impunity, with the result that two 3.7 inch HAA guns and their tractors had to be removed from deep gorges by emergency recovery teams from the workshops. Fortunately the water was not high at that time of year and dismantling could be carried out without too much discomfort.

The usual office routine would be relieved on occasion by the baying of hounds, the sound of a hunting horn, the thudding of horses' hooves and the resounding thumps against the walls of buildings as the local Hunt searched the estate for unwary foxes. I was told that no fox had been caught within memory of the headquarters staff, though we sometimes saw foxes sitting at a distance and watching the hunting party with some interest. The visits of the Hunt provided a touch of colour to the Scottish landscape but had little effect on the depredations of the foxes which killed all the general's chickens but did not dare to molest the geese.

The social life in Scotland reaches its peak of intensity at New Years when the festive occasion is celebrated in the traditional fashion with dinners and dances. The degree of celebration is sadly handicapped by the scarcity of good liquor—at the time I left, the ration for those lucky enough to be in HM forces was one bottle of Scotch, purchasable from the NAFFI every five months. The supply of good cheer available at the messes was usually adequate for all occasions, however, and I doubt that anyone suffered any real hardships.

The first personal problem to be solved in Edinburgh was that of locating a furnished house. Housing presents the same serious situation in Scotland as elsewhere in the UK so that we knew there would be ample competition in our search. We started by visiting all the agents in the city, making our needs known and viewing the two or three places which were available—unrented for reasons which became obvious when we saw them. Towards the end of a fruitless week of searching, however, a newspaper advertisement proved to offer the type of house for which we had been searching. As a result of the week's search we had found our home for the next year and were comfortably settled in Liberton, a suburb of Edinburgh. My neighbours, with a true Scottish sense of values, all told me that I was being required to pay too much for the house, for after all, who ever heard of anyone paying $77.00 a month for a comfortably furnished three bedroom house, even though it had good gardens in front and behind with a built-on garage and was situated in a good part of the city! They felt that inflation was becoming serious indeed, though a comparison between the rents in Ottawa and those in Edinburgh made them shiver.

3 Park Gardens, Liberton, Edinburgh

We found the year in Edinburgh to be the coldest and wettest of the three years of our stay. The coal ration is adequate to keep one's fireplace going, which ensured that the sitting room and kitchen could be kept warmer than the remainder of the house. As a result it often seemed warmer outside than indoors, depending on the room from which the comparison was made. The passing winter months brought moderating temperatures and slightly less rain, however, and for a few weeks in June we enjoyed such bright hot days and long peaceful evenings that the chill and discomfort of the preceeding months became little more than a memory. We soon learned that our friends were right when they said such weather could not last for the rains and chilly periods presently commenced again, continuing until we left in the midst of a gentle shower in October. A most unusual year, said our friends!

The year at No. 3AA Group Headquarters had been a good one, I thought, for it had enabled me to fit into the British Army as one of

(Please turn to page 45)

Tactical Exercise Without Troops

On the evenings of 25 and 26 January, 1951 the Active and Reserve Forces, RCEME, in the Vancouver Area under the overall supervision of the Area EME, Major H.W. Hagey, combined their talents to conduct a TEWT (Tactical Exercise Without Troops) on RCEME Repair and Recovery Facilities in the field. The object of this exercise was to explain the functions and handling of the RCEME facilities, in an Infantry Division with an Independant Armd Bde in support, in the Defence.

This TEWT was one of a series of such exercises being conducted at HQ BC Area by the various arms and services for the benefit of all Reserve Force officers and those Active Force officers studying for promotion and pre staff.

Last fall the Reserve Units in BC Area conducted an exercise on the Saanich Peninsula on Vancouver Island; this area was chosen for the RCEME TEWT as it would require less play of imagination and would also save a bit of time in explaining the ground.

A 1/2500 scale cloth model of the Saanich Peninsula was constructed. This model showed the main land and water features; the roads and railways and the various villages and settlements. The completed model measured 20' x 10'. An Infantry Division and an Independent Armd Bde were tactically set out in the defence. All RCEME units were shown while other arms and services were shown down to Bn or Regt'l level only. This drew considerable comment concerning the number of RCEME units and personnel within a force of this size. It might be noted here that AWDs were shown on the model and this caused some confusion as to whether or not they were units.

The exercise was conducted in two parts: an instructional portion in which the tactical picture was built up and the functions and establishments of the various RCEME appointments and units were described; the second portion was a general discussion period in which the discussion was kept moving by questions and answers put to the class by the directing staff.

In order to break the monotony of one speaker carrying the ball the instruction was broken into a series of short talks given by different officers. First the tactical picture was explained by Major R. MacClure, 8 Technical Regt RCEME. Here the overall RCEME functions were described and the RCEME appointments covered. Next, the individual units were discussed starting with the smallest ie, the LAD. This discussion was carried out by Lt R.N. Shaw, 214 Base Workshop, who covered the composition and employment of the various types of LADs. Next Lt C.A. Hurst, 11 Company RCEME, explained the employment of Armoured and Infantry Workshops, LAA Wksp and AWDs. He in turn was followed by Capt J.P. Beley, 8 Technical Regt RCEME, who covered the recovery aspects of all these units plus what help is usually received from without the division and integrated them into an overall recovery plan. Continuity between the speakers was maintained by Major MacClure, who summed up each talk and introduced the following subject and speaker.

To show graphically the composition of the various RCEME unit in the force, by means of wooden models of each type of vehicle within a RCEME unit.

After a ten minute break during which the students examined the cloth model and training aids, the general discussion was conducted by Lt-Col W.E. 'Squid' MacInnes, Commanding Officer, 8 Technical Regt. This discussion was kept alive by previously prepared questions that were asked the class. These questions brought out the most important points covered by the lecture and also brought out the RCEME requirements from the staff and units so that RCEME can be of maximum assistance.

This TEWT was conducted four times in all, twice for the combined AF and RF Officers, once for 2381 RCEME Cadet Corps. The comments from all sides were very favourable. Capt A.L. Evans, A&T Staff, 8 Technical Regt and Lt C.A. Hurst, 11 Company, RCEME, are to be highly commended on the care with which the cloth model and training aids were prepared.

Book Reviews

TURVEY by Earle Birney. Published by McClelland & Stewart Limited, Toronto. 288 pp. $3.25.

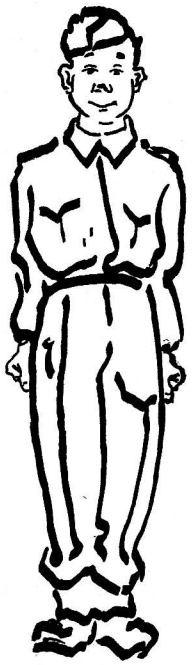
Sometime back in 1950 we heard of this story of Canadian Army life in World War II. For weeks we tried to get hold of it, to review it for the Quarterly. (We have no appropriation for buying books for review). Finally, we laid hands on a library copy, and for the next few hours made ourselves a perfect pest to our chair car neighbour by gargling with laughter.

The long and short of it is that there has not yet been published a better view of the Canadian Army, from the lowest level. The humour, uproarious and sympathetic in turn, is barbed occasionally with a sharp reminder that all wars have their seamy side.

The author calls this book a picaresque. I will leave you to look this word up in the dictionary, like I did. It's a revealing glance at oneself, for there are few types not covered, and any wearer of the Spam medal, with or without leaf, will surely find himself in the gallery. You may blush, you may laugh, but if you don't recognize yourself, you must lack the saving grace of humour.

It is not the business of a reviewer to make a digest of a book. But since most readers like to know what fare is to be served up to them, it may be said briefly that this Turvey, an ingenuous and broad-grinned youngster from Skookum Falls, BC, joins the CAA in 1942 and gets his discharge button in 1945 still a private, still wearing his ineradicable grin, but bearing many invisible scars, mental and physical. Ever the unwilling victim of SPOs and their O-tests, always on the losing end of encounters, hatless, with COs and presidents of DCM, the tool of black marketeers and the despair of NCOs, Pte Turvey, Thomas Leadbeater, is the classic example of the tiny rock in that vast concrete mixer, the modern Army.

It is the story of Private Turvey's Odyssey in search of the Kootenay Highlanders and his pal MacGillicuddy. I wish it were possible to quote at length from this book. Unfortunately, in some selections the language would not meet the high standard of purity required of the RCEME Quarterly: more shocking, perhaps, would be



Pte Turvey, Thomas Leadbeater,

the actual events taken out of context which are described so naturally as occurring to Private Turvey. It makes one wonder just how hypocritical one is from force of habit. The author describes how Turvey enlisted, was basically trained..... "With the other truckloads of fresh battledress, he was fallen out, warned that he was confined to camp until after supper Monday, fallen in for lunch parade, lined up to wash implements, fallen in for a sergeant-major's parade to hear eight pages of Camp Standing Orders, fallen out to wait an hour under the hot sun for a missing nominal roll, fallen in when it arrived, marched north to a blanket parade which came to nothing, marched east with his pack and haversack into a board hut furnished so compactly with double-tiered bunks it looked more like a warehouse than a place to live, marched back again on the double because it was some other squad's, marched west to an even more crowded one where he left his kit, brought back to a line-up, given blankets at last, sent to the hut to make his bed but whisked away south immediately into a longer line-up for supper, and another to wash his mug and billytin, and another at the latrine, and another for sunburn oil at Sally Ann. Then he was ordered back to his hut for the night."

The story goes on to tell how he was set to guard Niagara, courtmartialled for a trip AWL to Buffalo, goes overseas, investigates London, and after many false alarms (including an abor-

tive trip as Potential Officer Material to an OCTU) lands on the Continent. He is twice a casualty (though not through enemy action) and finally reaches the Sharp End. Only, alas, to find that his hometown pal and mentor MacGillicuddy has just had his head blown off.

After suffering, apparently interminably, at the hands of the RCAMC he survives diphtheria and its complications, and a brief thirty seconds before the ward is closed permanently to visitors, blurts out his proposal to Peggy, the bucktoothed little English girl:

"Turvey turned to Peggy. But before he spoke he grabbed the packet of cigarettes on his bedtable and shoved them hurriedly at Evans, together with an agonized gesture for silence. Then he looked carefully around the ward. There was no one approaching, and the patient behind Peggy was closely engaged with a female visitor of his own.

"Peggy", he said slowly and carefully, his voice rising in spite of himself, "will you, please, - please, will you marry me?"

"Oh Tops, Topsy Turvey," she said with a great sigh, "of course I will. I thought you'd never get it out." The next moment she was sitting on the bed and Turvey was finding a surprising return of strength in his arms, and a new fluttering which no cardiograph could possibly chart.

"Eeeyowee!" shouted Evans suddenly, "on markers; steady!"

"Gratulations, Tops. Hey, fellows, Turvey made the grade!" From the cheers during the next few moments it was evident that several others had been following Turvey's courtship with almost as much concern as he had.

"How does he do it?"

"Better get it in writing, girlie."

"Aint you got a ring for her, Tops?"

"Get up them stairs!"

"Aw, fellas, gimme a break, cantcha?" Turvey shouted, "I gotta lotta things to say!"

"Yah. Pipe down. Give the guy a chance."

"OK Tops, carry on. We aint listenin."

"Much," someone snickered. But soon the news precipitated another couple across the aisle into a similar announcement and the attention turned to them.....

"Gol darn it, I haven't got a ring or anything for you, even to be engaged with."

"O," said Peggy calmly, "I'd almost forgotten. Your other present. I had to wait to see if — it's really something from you to me." She dived into her bag again and brought out the little square box. When Turvey opened it he saw a slim silver ring centred with a diamond.

"It was my mother's," she said a little sadly, "she willed it to me. It was her engagement ring too. It's a good fit." She crooked her third left finger. Turvey slid it on.

"Then you really knew I was goin to —"

Peggy stood up and waved her left hand. "See chaps, he did have a ring."

The mounting whistles and offers to kiss the intended bride suddenly changed to wails at the sound of the hallway bell and the orderly's mechanical shouting:

"All vis'tors out! All vis'tors out!" Today he added a new sentence. "This ward is now closed to civilians until further notice....."

Author Birney does not bring the romance to its final conclusion. But he has made of Turvey an immortal of World War II.

* * * * * * * * * * * * * *

JOURNAL of the ROYAL ELECTRICAL and MECHANICAL ENGINEERS; Vol I, No. 1, January 1951. Published by Gale and Polden Ltd, Aldershot, England, 6" x 9 1/2", 96 pages, 5 shillings.

This is the first issue of the 'JOURNAL', which is edited and published by Headquarters, REME Training Centre, Arborfield. It bears no resemblance to the existing monthly publication 'The REME Magazine', which is a chatty periodical dealing principally with picnic parties, marriages and births.

The contents of the JOURNAL are of very considerable interest to members of our Corps and have, in fact, given the editors of the RCEME Quarterly a number of new ideas for our own paper. Most of the articles are illustrated, and all are excellently written.

The JOURNAL starts off with a description of the Royal Military Academy, Sandhurst, where the regular REME officer may spend five years, and follows with an article entitled 'The Staff, Technical Staff and the REME Officer.' There is a technical article on the surface treatment of metals for rust removal, with associated problems, and a survey of line production engine repair as carried out in a heavy workshop in the BAOR. Tire retreading in the BAOR is also covered. A well documented piece on the development of scientific fighting equipment of the British Army, 1900-1950, follows, and there is an extract from a paper on the fundamentals of industrial administration, by an RNVR Commander. Training is included in the scope of the JOURNAL with 'Drivers, Driving and Vehicle Maintenance', and 'Problems in Training African Soldier Tradesmen.' Articles of a general nature are on seaborne assault, atomic energy, and some notes on the trend of aircraft design, with particular reference to airborne operations. There is an outline of REME participation in the British Military Mission to Greece.

(Please turn to page 47)

necessity is the mother

"The trouble with you, you know," said the young man, flicking his cigarette in the general direction of my ash tray, "is that you lack an original approach to any new problem. You always try to get the answer by looking to see how it was done in some similar case in the past."

"Saves a lot of hard work," I said.

"Mental laziness, my dear boy. People will always avoid thinking, if at all possible. Let's take an example. Suppose you were the head of a research department and somebody came to you with a really knotty question, like, eh— what shall we say?"

"I dunno," I said.

"Well, what about bomb disposal?"

"Awright, what about it?"

"Well, the conventional way to dispose of a dud bomb is to sit on it and unscrew the fuse. That's what you'd do if you were really forced to do anything about it all. Then one day you'd find out that the enemy had thought of that one too, and tied the fuse on in such a way that the mere act of unscrewing it would detonate the bomb. So you'd be a write-off, same as you deserve. Now for the original approach. Let's think. What about getting the explosive out of the body first and to heck with the fuse?"

"Elementary, my dear Watson," I said, moving the cigarettes out of his reach.

"Could be, but somebody's got to get the idea. So you have to make a hole in the bomb case. Burning the hole with oxy-acetylene would be too hot, so we need a trepanning tool with a long flexible lead."

"So, you've made the hole. What'll you do next? Scoop the amatol out with your fingers?"

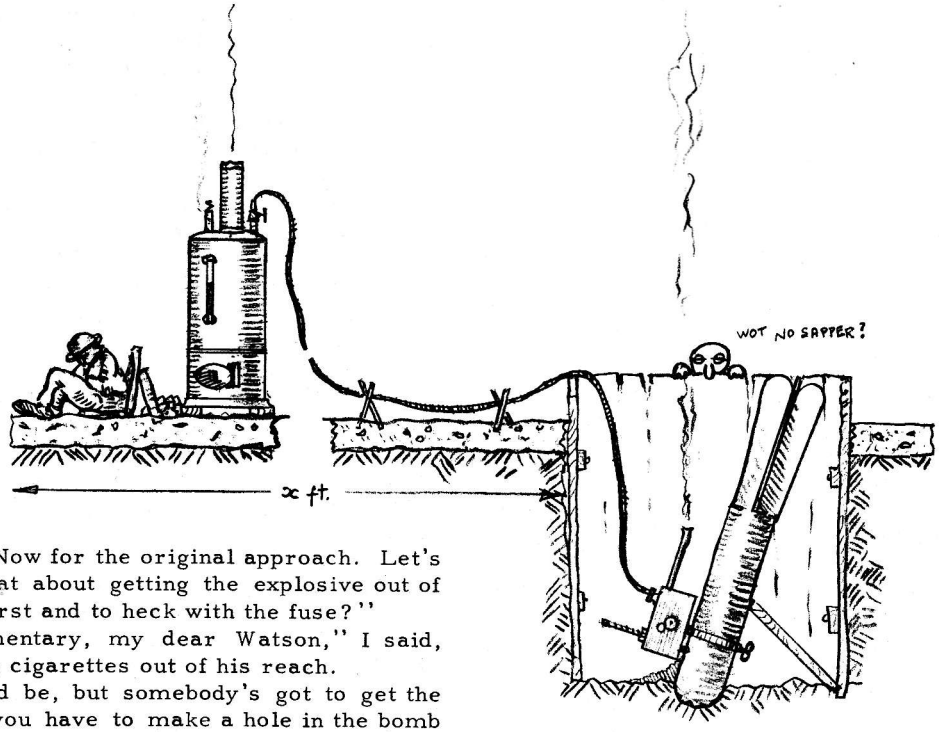
"Too crude, too crude. But we might stick a steam nozzle down the hole, melt the main filling with a jet of steam and eject the molten explosive by means of the steam pressure developing inside the bomb."

"I suppose you'd arrange for all dud bombs to fall within a couple of feet of boilers with steam up—that'd be part of the big plan—eh?"

"Come fella, use your noggin. You can have a little portable boiler set up 50 or 60 yards away and pipe the steam to where you want it."

My hackles rose. My lip curled, just like Steve Canyon's. "Smarty-pants", I said, between clenched teeth, "with all this palaver the poor engineer bloke would be sitting astride the hot seat wondering whether they'd ever find enough pieces of him to make it worth while to give him a decent burial."

"No, sir!" he said. "What I would do would be to design ONE gadget that'd go through the whole cycle of operations automatically once you'd attached it quietly but firmly to the bomb.



That is, it'd trepan the hole, melt the bomb filling, eject the molten explosive, and all the power'd be supplied by steam from the boiler sixty yards away."

"Can't be done, chum," I said lightly.

"Oh, it can't, can't it?" he said, making a grab for my cigarettes. "So you know best, eh? Well, that is exactly how it WAS done, see?"

EDITOR'S NOTE.—

[And if you don't believe him look up Vol 156, page 6 of the 'Proceedings of the Institute of Mechanical Engineers' for 1947, lecture by Mr. H. J. Gough on 'Research and Development applied to Bomb Disposal'. Remarkable isn't it?]

(CORPS ASSOCIATION continued from page 29)

organization to handle the personal problems of soldiers' families when called upon to do so. Towards this end Lt-Col F. W. Cranston was appointed to head a committee to assist in getting Auxiliaries set up across Canada. Lt-Col Cranston will filter the information he has obtained through Chapter Chairmen, and from regiments and independent squadrons.

In this connection it may be noted that the wives and girl friends of the officers of 4th Technical Regiment have already formed the nucleus of an Auxiliary subsequent to Col Boehm's initial contact.

There seems to be some reluctance on the part of Chapters and Groups of the RCEME Corps Association to appoint a publicity member to assist the chairman of the national publicity committee to maintain a flow of material and news to the RCEME Quarterly. In this connection may I urge the Chapter executives to complete the appointment and keep the news flowing in to your publicity committee chairman.

Capt L. R. Aiken, Chairman,
Publicity Committee,
RCEME Corps Association,
132 St. Patrick Street,
Toronto, Ontario.

(**EXCHANGE POSTING** continued from page 41)

their own officers and to observe its large organization and smoothly controlled growth during a period of adjustment and difficulty. There was great satisfaction in contributing even a little to the expansion of AA Command and in feeling that, in a small way, I had helped in making it a more effective instrument for the defence of a country which I had learned to admire and respect, and for whose citizens I felt the warmest cordiality. There had been a lot to learn and much to do, but under the wise guidance of Lt-Col S.J. Cox, ADME 3AA Group, the time passed so rapidly that the time to say goodbye to my many new friends came incredibly soon. I should like to thank them again for their courtesy, kindness and friendliness, and to assure them that when they visit Canada they will get the same welcome that they have always extended to their visitors.

(9-in RML continued from page 34)

The writer and the editors of the Quarterly are indebted to Capt Frank (Jerry) Nicks and Mr. H. Mitchell for their help in supplying much of the data given in the preceding paragraphs. They are both former gunners, who during their service fired equipment of this type in various parts of the Empire. Our very sincere thanks to them, and to Col Montgomery, for their valuable help.

PERSONALITIES

With the 'Pats' in Korea - Sgt R. J. Brown

* * * * *

PROMOTIONS

To be Lt-Col

Beddows, J. S. (seconded to DND Inspection Services)

Ward, K. R., DME

To be Major

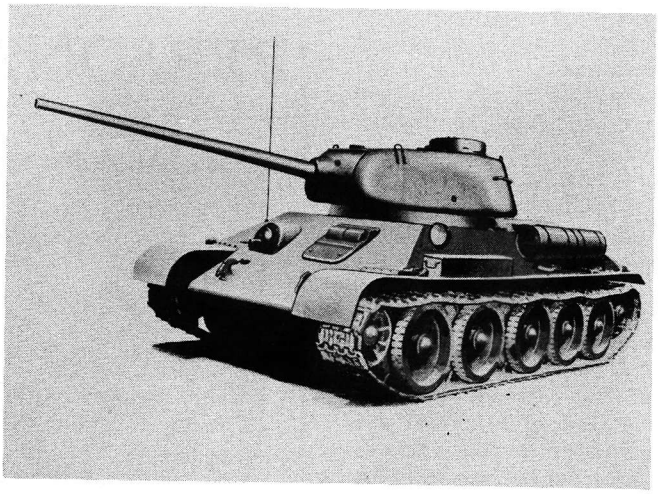
Beanlands, H. L., 6 Company

(Please turn to page 48)

THE T 34/85 RUSSIAN TANK

The daily press has recently given some considerable publicity to the use by the North Koreans, and their Chinese supporters, of the Russian-designed and manufactured T34 Medium Tank. Technical details have however been lacking, as is usual in the lay press. The following data is therefore supplied so that RCEME personnel can appreciate the reasons why the T34 Tank was considered to be one of the better tanks of World War II.

The tank weighs 35 tons, with a top speed of 30 mph, and is capable of climbing a 60 in 100 grade. It is powered by a diesel, 4 cycle, V-12 water-cooled, wet liner engine, developing 500 hp at 1,800 rpm. Normal power, however, is 400 hp. The fuel injection is effected by a Bosch fuel pump, which appears to be identical to the German product. Possibly it is actually made in Germany. Starting is by compressed air taken through a distributor to the cylinders; there is also an auxiliary electric starter. No lubricating oil filter is provided. Valves are operated by an overhead cam shaft, and valve adjustment is made by screwing a cap on the threaded valve stem.



It is interesting to note that, while the component parts of the engine are rough to a degree unacceptable in British or North American practice, the crank-shaft is polished. Each pair of opposed cylinders has one master rod and a connecting rod: the cylinder bore is 150 mm, and the stroke is 180 mm in the left bank and 185.7 mm in the right. Vibration dampers are not used, the crank-shaft being designed so that its major frequencies are out of operating range. The estimated life of the engine is 200 hours. The engine which is mounted lengthwise, to the rear of the turret, has its radiators mounted on either side of it, and drives the tracks through rear sprockets.

Steering is by steering clutches on each output shaft. They are multiple-disk with multiple springs. This system of steering is, of course, almost universally used in commercial tractors, but British and American tank design has adopted controlled differential steering as being more efficient. The Valentine tank was the last one made in this country with clutch steering. The transmission has four forward speeds and one reverse. The suspension is of the Christie type, using compression springs bearing on bogie arms pivoted on suspension shafts fixed to the tank chassis. Specific track pressure is lower than that of the Sherman series, like our Medium 4A2.

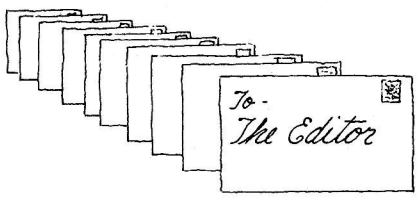
The T34/85 nomenclature indicates that this model is armed with an 85 mm gun. This is of the vertical sliding breech-block design with a fairly high rate of fire; electric fan ventilating is provided to remove bore gases. There is no gyro-stabilizer of any kind. The motor or hand-operated turret is said to be unbalanced by the gun, making traversing difficult. Radio communication is provided. Armour is 2-in along the front of the body, and 3-in on exposed turret areas. The welding of the turret would not pass our inspection.

An analysis of this tank's design characteristics and performance, which appeared in an American trade magazine recently, emphasizes that all the component parts are precisely designed to the same life-expectancy. Crew comfort is not considered and the armour will not be proof against a direct hit. It is estimated that in the United States the production costs for a similar design might be about $30,000.00.

The workmanship may be crude, but it cannot be denied that the tank does just do the job it was designed for.

* *
* *
* "Not a bad little magazine, the RCEME *
* Quarterly. Trouble is, I never seem to *
* have time to read it properly....." *
* *
* *

Letters



Headquarters,
Eastern Command,
Hounslow,
Middlesex,
England.

Dear Colonel Boehm:

I am writing on behalf of my DDME, Brigadier Howard, to ask whether you would be so kind as to send a copy of the RCEME Quarterly, Volume 2, Number 3, to us.

We have No. 4, and are interested in Lieut Protheroe's article on '100 Man' Workshop, but of course, Part I of the article is in (presumably) the previous Number.

So far, I have been quite unable to track down Number 3, although I presume there must be a copy somewhere in the UK.

I have lately been doing an amount of somewhat sketchy workshop planning, and consider your layout, as illustrated, very neat and businesslike. Although the workshops we are concerned with are of a somewhat different type and function, there is nothing like reading up other peoples' ideas on the subject!

Best wishes for 1951 to your excellent journal.

Yours sincerely,
J. A. Tatmah, (Lt-Col),
(ADME E Comd).

(BOOK REVIEWS continued from page 43)

One of the most graphical contributions concerns the recovery of a German radio-controlled Goliath tank at Anzio. The enemy vehicle became a casualty some 400 yards out in front of the allied line. This no-man's-land was completely covered by enemy fire, artillery, mortar and small arms, supported by infra-red detection apparatus. The problem was solved by locating a Scammel recovery vehicle behind cover and attaching the necessary length of twin balloon cable to the derelict, as is shown on the accompanying cuts. It does not need much imagination to realize that this was not as easy as the author dispassionately states. The entire area was heavily mined, wired, and almost constantly illuminated by flares and the flashes of bursting shells. Furthermore, there was little cover. The story covers two attempts, the second of which was successful, in spite of the temporary set-back described below:-

"Off we went into the darkness, but for a good twenty minutes after our departure the rear party received no signal from us, nor any sign to indicate that all was well. There was little they could do but watch for the familiar green flash as they leaned close against the buttress of the bridge in order to get protection from the stray machine-gun fire which 'Jerry' was in the habit of spraying periodically through the arch of the fly-over.

What had happened was that, a hundred yards from where the Goliath lay, we encountered what seemed to be an enemy patrol. Suspense ran high, but fire was fortunately withheld. After considerable manoeuvring by the three of us on all fours, I went forward, pistol at the ready, to discover that the 'enemy' was a party of our own infantry silently wiring-in one of our forward posts."

The Goliath tank was duly recovered at 0300 hours, intact, and General Mark Clark, Fifth Army Commander, ordered its immediate dispatch to America for examination. Two of the recovery party got 'mentions' and Lt Smith the MBE. The author, Lt-Col M. E. O'Gorman, accompanied and directed the patrol on both occasions.

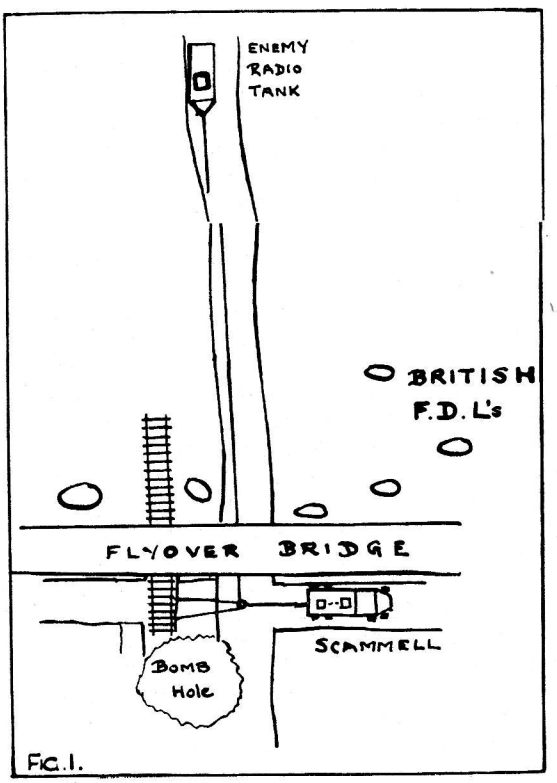


FIG. 1.

Brignell, E. M., 11 Company
Fulford, R. K., On course RCEME School
Laver, E. W., CASC Staff
McClelland, L. E., RCEME School
Provan, C. G., RCEME School
Wilson, J. A., DME

To be Captain
Bishop, E. P., VDE, AHQ
Cuddihey, J. J. E., 2 Company
Deibert, B. M., "A" Sqn 1/2 Armd Regt
Goodings, B. H., DME
Hamilton, C. J., 4 Company
Hann, H. V., 200 Base Workshop
Johnson, F. G., 211 Base Workshop
Love, L. H., 1 RDU
McKinnon, J. A., 11 Company
Ruscher, M., 23 Comp Bde Gp Wksp
Vollett, R. W., 2 Company
Yarymowich, B., 202 Base Workshop

To be Lieut
Hellyer, C. B., 11 Company

POSTINGS
Lt-Col Hamilton, W. G., DME
Major Bromage, T., 13 Company
Major Garnett, J. J., 11 Company
Major Hagey, H. W., DME
Major McLarnon, J. R., 4 Company
Capt Belcher, G. A., 17 Company
Capt Boughton, J. C., DME
Capt Branston, W. J., 3 Company
Capt Cooper, F. E., DSD, AHQ
Capt Coultish, F., RMC
Capt Demone, F. L., HQ RCEME Central Comd
Capt Hewson, J. M., 18 Company
Capt Jeffery, A. J., D Org, AHQ
Capt Loughridge, J. L., 12 Company

* * * * * * * * * * *

The following are new appointments to commission in RCEME:
2/Lieut Hansen, P. E. V., NS Tech College
2/Lieut Kennah, K. T., NS Tech College
2/Lieut Laviolette, N. E., NS Tech College
2/Lieut MacLeod, R. H., NS Tech College
2/Lieut Metcalf, J. G. E., Queen's University

DIED

The sudden passing of Cfn Cecil Philemon Wright came as a shock to his many friends throughout the Ottawa area.

Cfn Wright died early on the morning of 1 Feb 51 in the Ottawa General Hospital as the result of having been struck down by an Ottawa Transportation Bus the previous evening.

Cfn Wright enlisted in the Active Force in May 42 in the RCOC and was employed with Central Ordnance Depot, Ottawa, for a time. In Apr 44 he was posted to the Vehicle Development Establishment, Proving Ground Detachment. Except for a period when he was a member of the Pacific Force, prior to cessation of hostilities in Japan, he continued working there until his death.

Cfn Wright was a vehicle mechanic specializing on tracked mounts and contributed greatly in the development of snow and mud type vehicles. He was on more than one occasion a member of Arctic Test Teams operating at Fort Churchill and White Horse, YT. He also played an important part during the Winnipeg floods of 1950 as a member of 'Operation Red Ramp' for which he was highly commended by the Winnipeg Free Press.

Cecil Wright was born at Ironsides, PQ, in 1916 and was educated in Ottawa. He was an ardent sports fan and a tennis player of note a few years ago. In 1940 he married the former Winnifred May Walsh who with a son and daughter survive him.

Cfn Wright was buried on 3 Feb with full military honours in the Beechwood Cemetery. Pallbearers were members of the Vehicle Proving Grounds.

Deepest sympathy is extended to Mrs. Wright and family.

—S/Sgt V. A. Godmere, RCEME

Capt Warren, returning in his car from a Corps Association meeting at Thorold, Ontario, on Saturday, 17 Feb 51, ran into a cement abutment and was killed.

Capt Warren had served with the Cdn Army since 1935 and although only with RCEME since 9 Jun 44 was well known and well liked by all concerned.

Since 6 Nov 50 he had been employed as Adjutant HQ RCEME, Central Command under Lt-Col H. L. K. Mason.

On Tuesday, 20 Feb 51, a military funeral was held in the Dundas Cemetery. Personnel from 206 Workshop, Malton composed the pallbearers and funeral party, while the honourary pallbearers were: Lt-Col Mason, Majors J. H. F. Read, J. W. Whittingham, F. R. Kaye; Captains F. L. DeMone, F. Coultish, R. E. Austin, and W. E. Ellis. Many other officers, both RCEME and other Corps, from HQ Central Command were in attendance. Col M. L. Brennan represented the General Officer Commanding Central Command.

Deepest sympathy is extended to Mrs. Warren and family.

—Major J. W. Whittingham.